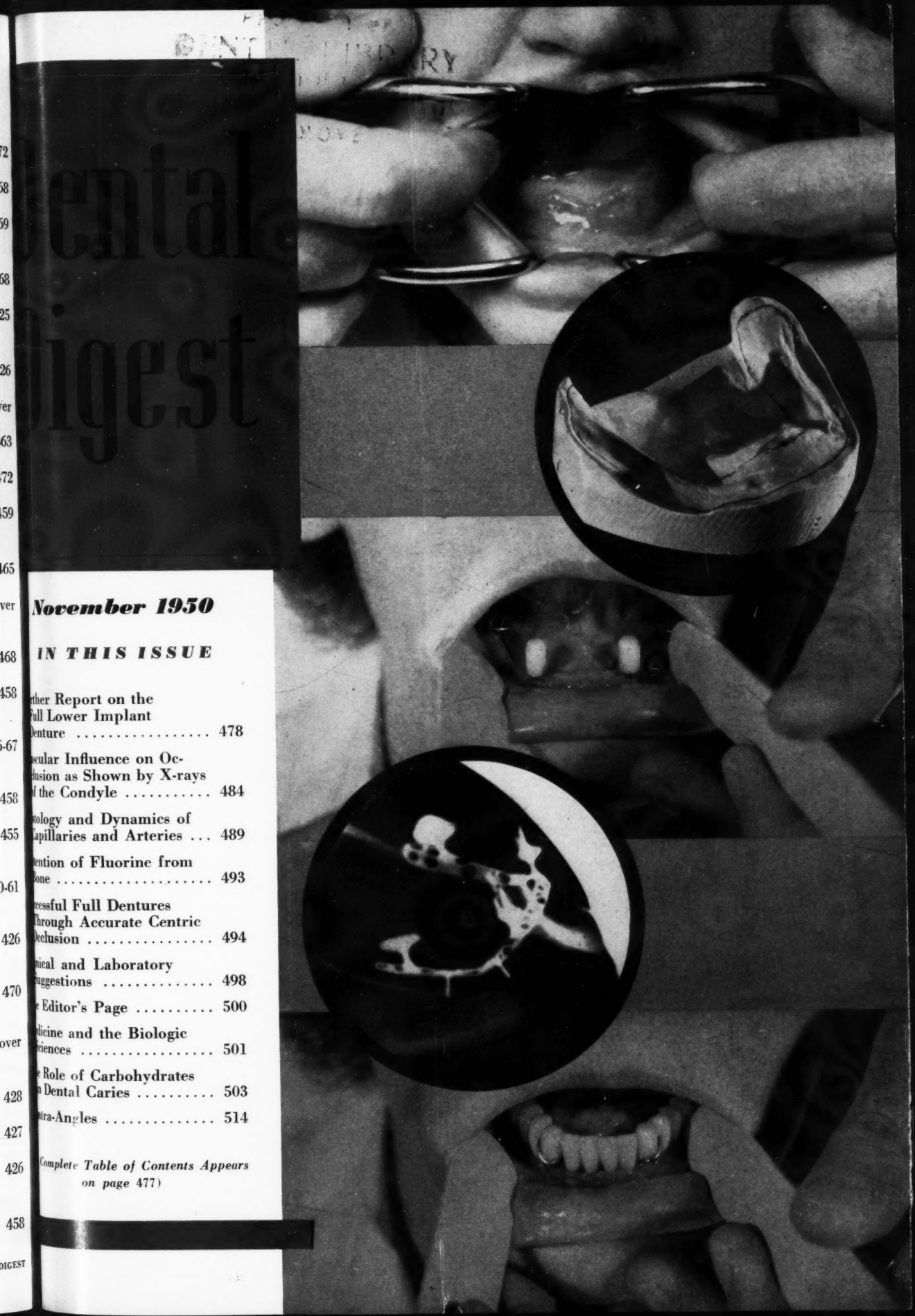

ental digest

November 1950

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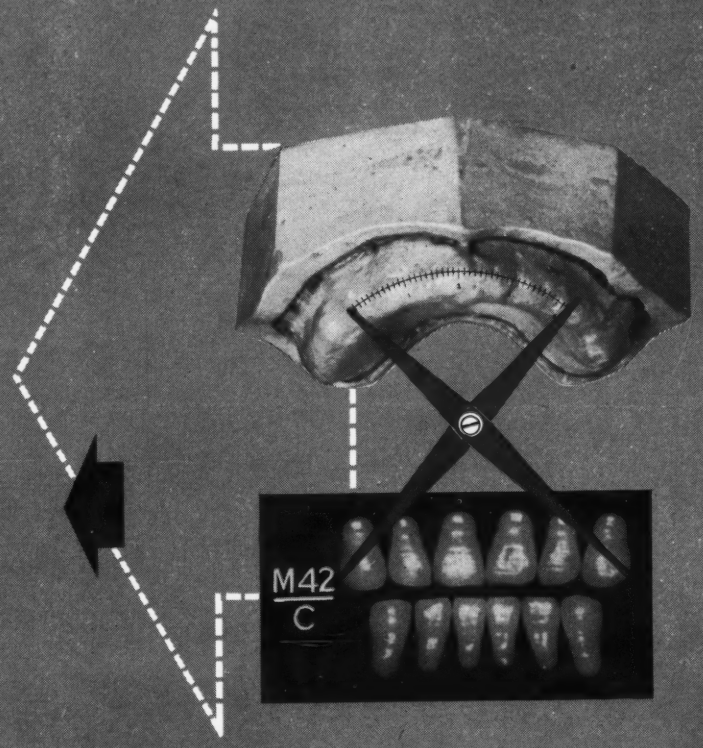

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About Our CONTRIBUTORS

NORMAN I. GOLDBERG, D.D.S. (Temple University, School of Dentistry, 1943) and AARON GERSHKOFF, B.S. (Providence College, 1936), D.D.S. (Temple University, School of Dentistry, 1941) published a report in DIGEST in November, 1949 on the results of their experiments with a procedure which represented a departure from conventional methods in implantations for lower dentures. In the current issue Doctor Goldberg and Doctor Gershkoff present FURTHER REPORT ON THE FULL LOWER IMPLANT DENTURE.

LEONARD FRANK, a roentgenologist of international reputation, is a frequent contributor to DENTAL DIGEST. The context of Mr. Frank's article in the current issue, MUSCULAR INFLUENCE ON OCCLUSION AS SHOWN BY X-RAYS OF THE CONDYLE, was presented in the form of a paper read before the 51st meeting of the College of Physicians and Surgeons Alumni.

HANS ELIAS, Ph.D. (University of Giessen, Germany, 1931) who is engaged in research and teaching at the Chicago Medical School presents the second installment of a series of three groups of illustrations dealing with HISTOLOGY AND DYNAMICS OF CAPILLARIES AND ARTERIES.

MEYER M. SILVERMAN, D.D.S. (Georgetown University, School of Dentistry, 1934) will be remembered for his article on speaking centric in the March, 1950 issue. Doctor Silverman's current article, SUCCESSFUL FULL DENTURES THROUGH ACCURATE CENTRIC OCCLUSION, describes an original method for permanently recording normal centric occlusion.

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Further Report on the

FULL LOWER IMPLANT DENTURE

NORMAN I. GOLDBERG, D.D.S.,
and AARON GERSHKOFF, B.S., D.D.S., Providence

DIGEST

The article on the full lower implant denture which appeared in the November 1949 issue of Dental Digest described the prosthetic and surgical procedure of the technique. Basically, these procedures have remained the same although a few modifications have been introduced. The use of an x-ray template for accurate preoperative tissue measurement is described in detail.

This article deals with the results obtained in twenty-four cases over a clinical period of two years. Of the twenty-four cases, fourteen implant dentures were inserted in male patients and ten in female patients, the ages ranging from thirty-seven years to seventy-two years. These patients had been edentulous from fifteen months to thirty years. In all cases, the implant denture was inserted only after several sets of conventional dentures proved to be failures. Two case histories are included in the present report.

Modifications of the Implant Technique

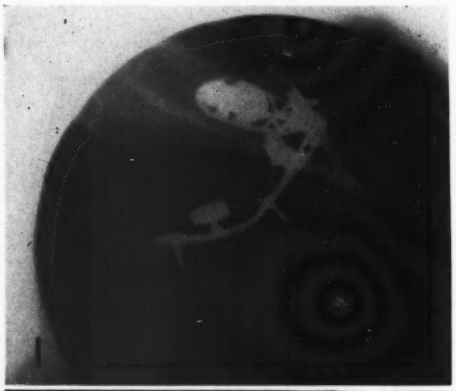
Further experience in the use of the implant denture technique has shown the necessity of making several changes in the original procedure.

Position and Design of Screws—1. Four screws proved to be adequate in securing the implant to the bone.

2. It was found to be unnecessary to place anterior screws.

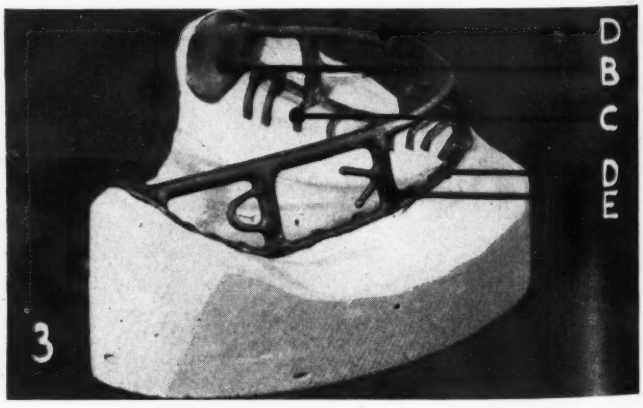
3. An implant denture screw has been developed which has greater retentive qualities than the screws previously available (Figs. 1 and 2).

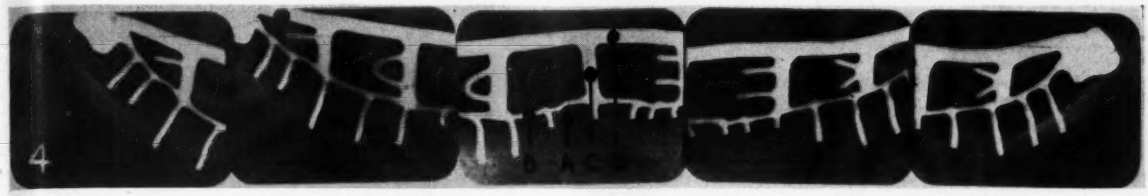
Method of Determining the Fit of the Implant to the Bone—Two of the early cases were failures and the im-



1. ***Left: Implant in position four months. New type implant denture screw placed distal to posterior abutment and between anterior and posterior abutments. Note accurate adaptation of implant to bone.***
2. ***Below left: Implant in position twenty-one months. Compare position of screws with Figure 1. Note anterior screws present. Anterior screws are not used with present technique.***

3. ***X-ray template in position on original model. (A) Ridge bar. (B) Saddle over retromolar pad area. (C) Lingual extensions. (D) Connecting bar. (E) Supporting bars.***





4. *X-rays of template in position in mouth. (A) Thickness of tissue between ridge bar and crest of bone. (B) Ridge bar. (C) Supporting bar. (D) Connecting bar.*

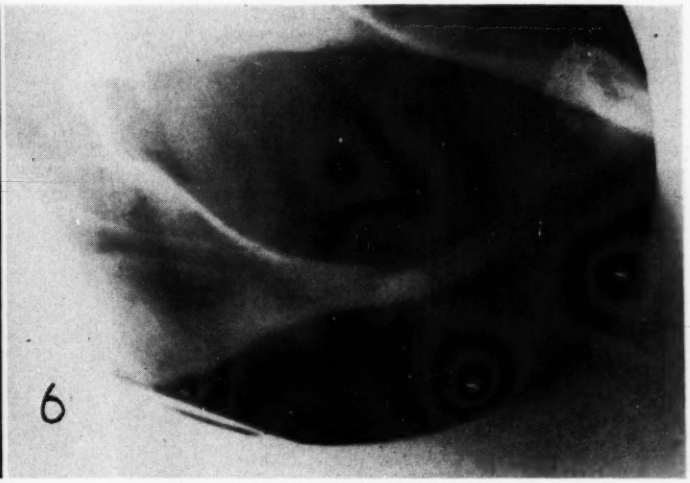
plants were removed. The cause of the failures was that the implant did not fit the bone properly. Since the occurrence of the failures, an accurate method of determining the fit of the implant to the bone has been developed.

X-ray Template Devised—In the early days of working with implants an accurate method of determining the thickness of the tissue overlying the bone ridge was not available.

A series of underexposed intraoral x-rays were used which provided an approximate outline of the mucosa, but it was difficult to transfer the x-ray readings to the model with any degree of accuracy.

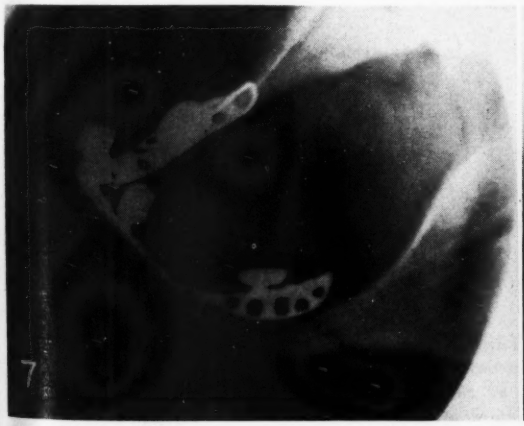
A few cases were inserted by this method but after two unsuccessful cases it became evident that this inadequate technique must be remedied. The nature of the difficulty in the two cases was mechanical and not physiologic.

If the implant fits the bone and proper surgical and prosthetic treat-



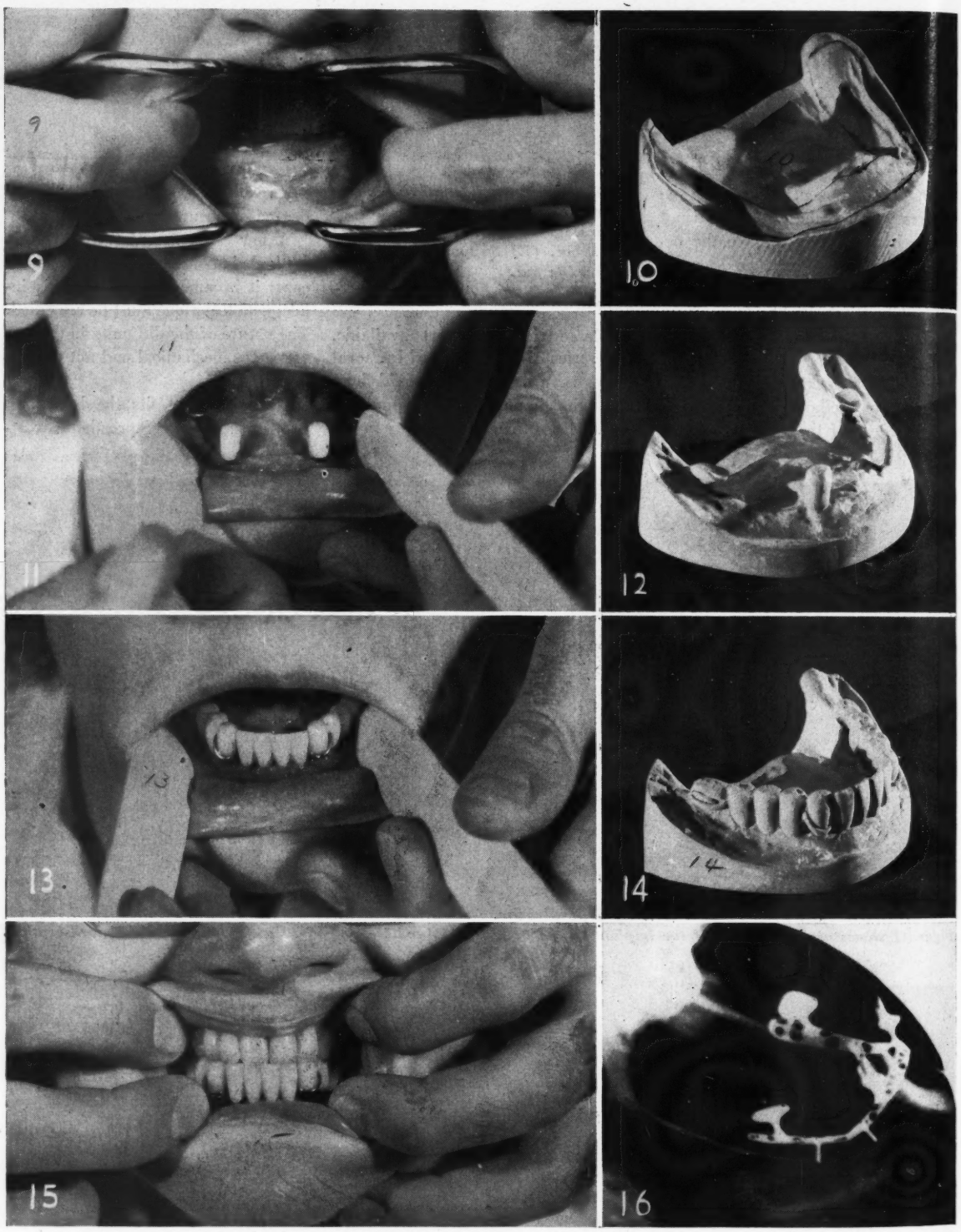
5. *Prepared model. Preparation resembles exposed bone. Figure 1 shows accuracy of fit of the implant to the bone made from this prepared model.*

6. *Mandible of patient with complete alveolar resorption.*



7. *X-ray of implant inserted March, 1950.*

8. *X-ray of implant and implant denture in position. (A) Implant. (B) Implant denture framework. (C) Metal occlusals of new type resinous tooth.*



9. *Condition of mouth showing mandibular ridge lower than floor of mouth.*

10. *Model of the same mouth.*

11. *Condition of mucosa with implant in position one year.*

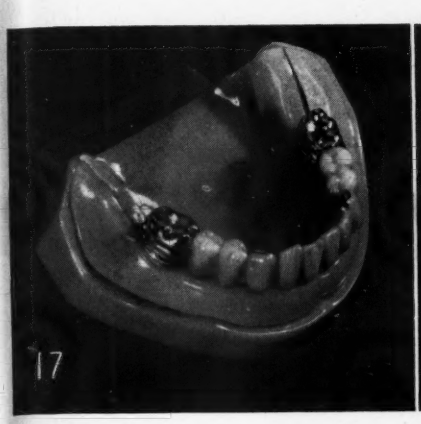
12. *Stone model of implant abutments and overlying mucosa. An impression can be taken of the abutments in the event a new denture is needed.*

13. *Implant denture in position. Note butting of teeth to mucosa.*

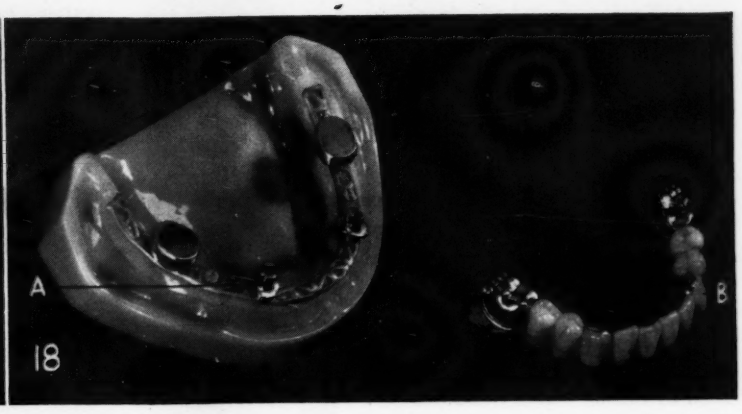
14. *Stone model showing implant denture seated on abutments.*

15. *Implant denture in occlusion with full upper denture.*

16. *Lateral plate of implant in position one year.*



17. ***Modified implant denture design showing no anterior clasps and posterior all-metal onlay effect.***



18. ***Modified implant design. (A) Anterior abutment as semi-precision attachment. (B) Telescope crown.***

ment is followed, the procedure is successful. The x-ray template was devised whereby intraoral findings could be accurately transferred to the model.

Description: The template (Fig. 3) is a metal casting composed of a narrow ridge bar (Fig. 3A) following the curvatures of the ridge extending to the retromolar pads. The retromolar pad area is covered by a saddle for stability (Fig. 3B).

Interpretation of Measurements: 1. The radiolucent area which appears on the x-rays between the crest of bone and ridge bar is the thickness of tissue overlying the bone (Fig. 4A).

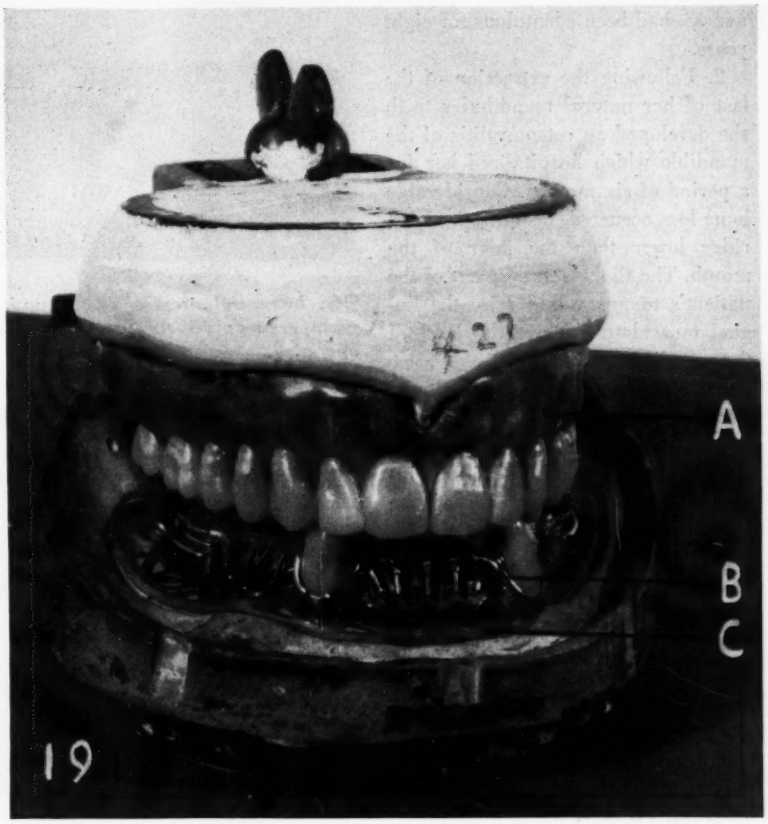
2. The ridge bar has lingual extensions spaced 5 millimeters apart which serve as a guide in measuring tissue depth every 5 millimeters all around the ridge when the template is transferred to the model (Fig. 3C).

3. One-half inch above and parallel to the ridge bar is a connecting bar which supports the x-ray film (Fig. 3D).

4. Between the ridge bar and connecting bar are four or more supporting bars which aid in orientation (Fig. 3E).

Method of Use of the Template—1. With the template positioned in the mouth, five intraoral films are taken (Fig. 4).

2. The template is then transferred to the model and appropriate markings are made on the model from the x-ray readings.



19. ***Assembled practical case on model ready for insertion. (A) Completed full upper denture. (B) Implant denture framework; teeth are not processed to framework at this stage. Note how anterior clasps engage metal for retention. (C) Implant cast to prepared model.***

3. The model is prepared according to these markings (Fig. 5). The carefully prepared model should resemble the bone after the mucoperiosteum is retracted.

Comment—The proper use of this technique will result in an implant that accurately fits the bone (Fig. 1). The x-ray template can also be used as an aid in locating the exact position of (1) foreign bodies, (2) retained roots, or (3) pathologic condi-

tions that may be present in the edentulous mandible.

Case Histories

Case One—1. A male patient, age 58, had had innumerable dentures over a period of twenty-six years.

2. Traumatic injury by a series of ill-fitting dentures resulted in complete atrophy of the mandibular ridge (Fig. 6).

3. The patient was obviously a denture neurotic but was definitely in need of further dental health service. The implant denture was clearly indicated and was inserted. (Figs. 7 and 8).

Case Two—1. A female patient, age 43, had been edentulous for eight years.

2. Following the extraction of the last of her natural mandibular teeth she developed an osteomyelitis of the mandible which hospitalized her for a period of six months. Considerable bone loss occurred, resulting in a flat ridge lower than the floor of the mouth. The slightest movement of the patient's tongue would raise the lingual musculature above the level of the mandibular ridge.

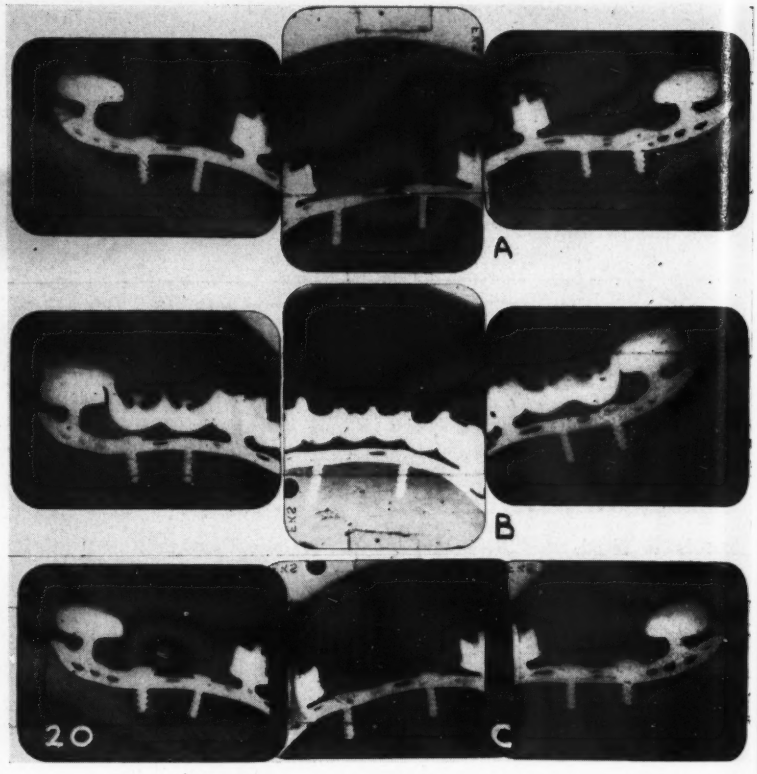
3. Several conventional dentures were constructed for esthetic reasons, rather than for function. There was some doubt of the advisability of inserting an implant because of the possibility of a recurrence of the infection. However, x-ray examination revealed no disease present.

4. An implant was inserted in October, 1949. Primary healing of the mucosa occurred and recovery was uneventful. Periodic examinations by x-ray have revealed no bone changes and the prosthetic appliance affords the patient complete comfort and utility (Figs. 9 to 16).

Age Unrelated to Results

1. In this series of implant denture cases age was not a factor in the results obtained. The general health of the patient was found to be of more significance than chronologic age.

2. The length of time that a patient should be edentulous before an implant is inserted depends largely upon the amount of alveolar resorption that has taken place.



20. *Intraroral x-rays of case in position since February, 1949. (A) Six months postoperative; (B) twelve months postoperative; (C) eighteen months postoperative.*

21. *Lateral plate of case in position three months. Note meshwork pattern and position of screws.*

22. *Intraoral films, immediately postoperative. Note perfect fit of casting to bone.*

3. The low flat ridges that approach senile atrophy are ideal because alveolar bone is entirely or almost completely absent. If a high alveolar crest is present (usually to be found in the anterior section of the mouth) an alveolectomy should be performed.

Summary

1. Implant dentures that fit the bone are successful.

2. Careful and accurate model preparations are essential in obtaining proper fit.

3. Accuracy is accomplished by the proper use of the x-ray template.

4. The change of position and type of screws was not necessary for successful implant procedure. The change was made to facilitate the technique.

5. Twenty-four patients over a period of two years have received a denture service that conventional dentures were unable to fulfill.

343 *Thayer Street.*

Twelve Hints on Diagnosis

EARLE H. THOMAS, M.D., D.D.S., LL.B., Chicago

1. Pain indicated by pressure of the patient's finger as being in a gland in the neck may instead be in the cervical vertebrae.

2. Pain and soreness along the anterior border of the ramus of the mandible are usually caused by gingival infection around the lower second or third molar.

3. Swelling and pain in the soft tissue buccal to the lower first molar are often caused by subperiosteal extension of infection from a lower third molar.

4. Acute infections causing soreness of the gums, cheeks and other soft tissues of the mouth may stem from local infection superimposed on manifestations in the mouth of any one of numerous systemic diseases. Most common are vitamin deficiencies, metal or drug poisonings, diabetes, blood dyscrasias and menopausal disturbances in ovarian secretion.

5. Swelling and pain over the temple are more likely to be caused by infection from lower than from upper molars. Extension of the pain over the side of the head makes this diagnosis more definite. The route of the infection is along the fascia of the temporal muscle but the ingress occurs where this muscle is attached to the anterior border of the ramus of the mandible.

6. A burning pain on the side of the tongue or a metallic taste in the mouth is most often caused by a closed bite although the former can be caused by systemic toxins and the latter by electrolysis.

7. A burning pain on the inside of the lower lip is often caused by the exertion of great pressure on the posterior ends of a lower denture.

8. Inflammations in the upper third molar region often cause referred aching pain in the lower bicuspids on the same side.

9. Neuralgic pain in the lower jaw or ear after removal of an impacted lower third molar is not necessarily caused by infection in the socket. It may be the result of pressure against the nerve by the bony roof of the inferior dental canal which has been bent downward by the third molar. Temporary paralysis of the nerve with associated numbness of the lip can be caused in the same way.

10. In patients wearing full dentures, closed bites are the cause of many cases of facial neuralgia.

11. A painful lateral abscess adjacent to the root of a tooth with a vital pulp can be caused by a so-called pyorrhea pocket, the width of which may be only that of a fine explorer. Even an extremely narrow pocket can extend to the apical region and cause apical bone destruction.

12. Pain in upper bicuspid and molar teeth can be caused by acute infection of the maxillary sinuses.

From *Journal of the American Dental Association* **34**:744-745 (June 1) 1947.

MUSCULAR INFLUENCE *on* OCCLUSION

as Shown by X-rays of the Condyle

LEONARD FRANK, San Francisco

DIGEST

The investigations described in this paper were undertaken in order to answer the question, "Are the condyles the servants of the muscles?"

For a number of years investigations have been conducted concerning the influence of the condyle and the muscles in relation to occlusion. The x-ray studies illustrating this paper are the result of the effort to establish visual scientific information regarding condylar guidance or muscular guidance as the controlling factor in occlusion.

A Comprehensive Radiographic Examination

The present concept of what constitutes a complete radiographic examination of the condyle could well be subjected to revision. The conventional method has been to take x-rays of the condyle in open and closed positions (Fig. 1). This is only a part of a complete examination. In order to complete the examination, x-rays of the condyle should be taken with the teeth (1) in balance and working positions, and (2) in protrusive and retrusive positions.

All Movements Should be X-rayed—As different muscles control different movements it would be unwise to base a conclusion on the movements of the condyle from x-rays of one set of motions, such as open and closed positions (Fig. 1). The series should include x-rays of the condyle in all of its movements, vertical, horizontal, and lateral, before attempting to reach a definite conclusion (Fig. 8).

Figure 2—The fallacy of an inadequate exploratory examination is illustrated in Figure 2: 1. The condyle with the mandible in centric is shown in Number 1.

2. The condyle with the mandible dropped open 20 millimeters is shown in Number 2.

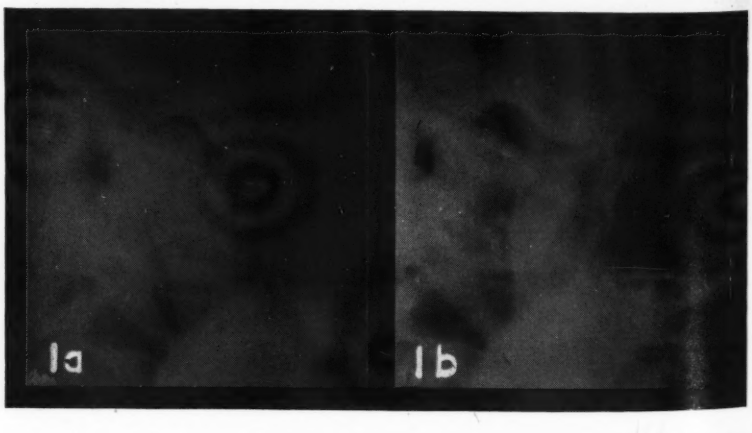
3. A comparative examination of films Number 1 and Number 2 shows virtually no change of position of the condyle in relation to the fossa. If these two x-rays had been accepted as fact an erroneous finding would have resulted.

Ocular Examination—It was revealed by ocular examination that when the patient dropped the mandible open it shifted moderately to the left. This shifting of the mandible, when the mandible drops open, is not unusual. When shifting occurs it is merely a matter of degree at what point the shift will cause the muscles to influence the position of the condyle adversely.

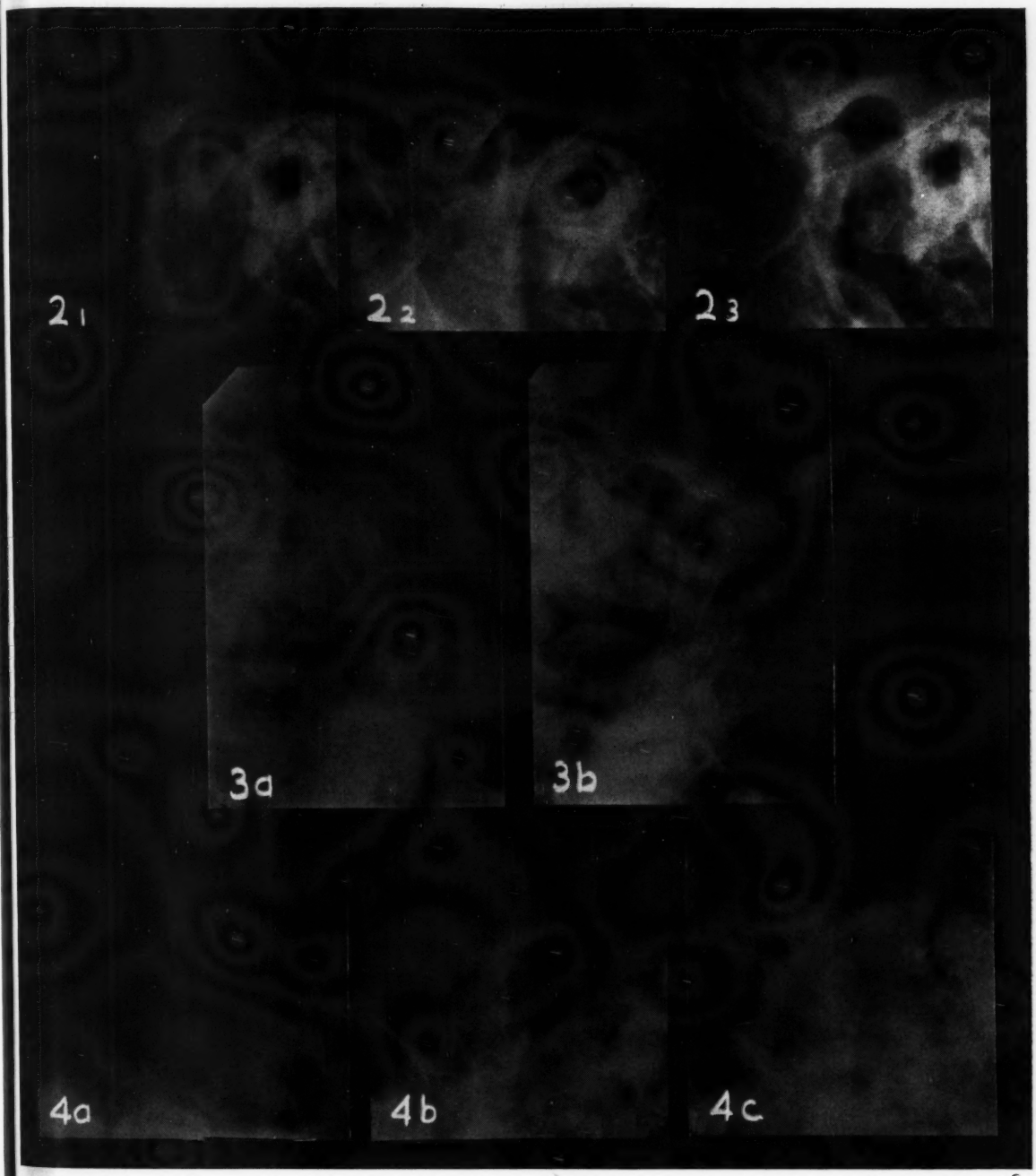
A Third X-ray Taken—Using the same 20-millimeter opening, with care that the mandible did not shift, a third x-ray was taken. View Number 3 in Figure 2 is the result, showing that when the mandible dropped open properly the condyle dropped downward and forward normally.

Reason for Erroneous Finding—In film Number 2 the x-rays were being taken of the left condyle. With the mandible dropped open 20 millimeters and shifted to the left, the condyle (because of the shift to the left) moved into a simulated working position, thus confusing the results.

Figure 8—Had a complete series of this condyle been taken (Fig. 8) the error would have been detected instantly as the series would have included (A) the protrusive position (Fig. 8, No. 5), and (B) the balance position (Fig. 8, No. 6). Normally there is no possibility of the condyle remaining in the deep part of the fossa in these two positions because of the forward sled-like pull of the external pterygoid muscle.



1. ***Conventional condylar examination. A, closed position. B, open position.***



2. *A simulated working position. No. 1, Condyle with mandible in central position; No. 2, condyle with mandible open 20 millimeters, showing simulated working position due to the shifting of the mandible to the left; No. 3, the same condyle as No. 2 with the mandible open 20 millimeters, showing proper movement down and forward to the eminentia.*

3. *A simulated dislocation. A, condyle with the mandible in centric position. B, condyle with the jaw dropped open, showing a simulated dislocation.*

4. *Reaction of the condyle under pressure. A, position of the condyle with pressure exerted in the incisal region; B, position of the condyle with the pressure exerted in left molar-bicuspid region; C, position of condyle with pressure exerted in right molar bicuspid region.*

Movements of the Temporomandibular Joint

Anatomically, the temporomandibular joint is described as a free joint, because, within wide limits, any point of the lower jaw may be moved freely in all three directions.

The Directions—1. The hinge movement by which the jaw is raised and lowered. This movement takes place in the lower cavity between the meniscus and the condyle.

2. Protrusion, and to a slight degree, retraction of the mandible takes place between the meniscus and the glenoid fossa in the upper cavity with the articular tubercle. This is a gliding movement.

3. The rotary movement enables the jaw to move laterally from side to side.

Function—Ginglymo, meaning hinge, and arthrodial, meaning gliding or sliding, the description of the joint, ginglymo-arthrodial, is self-explanatory. The temporomandibular joint is a gliding sliding hinge and in all probability its only function is to act as a floating hinge, its position fixed by the muscles in relation to the vertical, its motive power being the muscles.

Theory of Muscular Control

X-rays of the temporomandibular joint show the condyles in various degrees of movement, (1) downward and forward out of the fossae, (2) back again into the fossae, and (3) laterally to and from the median line. These movements support the theory of muscular control of occlusion.

Position of the Condyle—1. X-rays show that the condyle does not change its position of itself. It is only when the muscles are brought into play that the position of the condyle changes. 2. For this reason it would seem that the condyle does not dictate the vertical dimension. Apparently it is the vertical dimension that dictates the position of the condyle. 3. Whether the vertical is open or closed or normal the muscles will move the condyle into a position to correspond with that particular opening.

Anatomy of the Mandible—It will be recalled (1) that the mandible hangs in a muscular sling composed of the masseter and the internal pterygoid muscles, (2) the external pterygoid muscle attaches itself to the condyle, and (3) the stylomandibular ligament acts as a checkrein for the whole mechanism.

Motion Limited by Ligaments—Shapiro[1] states "muscular action is of major importance in maintaining the position of the joint; the ligaments, playing a minor role in the performance of this function, aid in limiting the extent of motion."

[1]Shapiro, Harry H.: Applied Anatomy of the Head and Neck, Philadelphia, J. B. Lippincott Company, 1947.

5. ***Fractured condyle. A, x-ray of frature before splinting. B, x-ray of fracture at the end of ten months.***

6. ***X-rays of the glenoid fossae of Figure 5, showing the right condyle in normal position in the fossa. The left fossa shows no condyle present within its borders.***

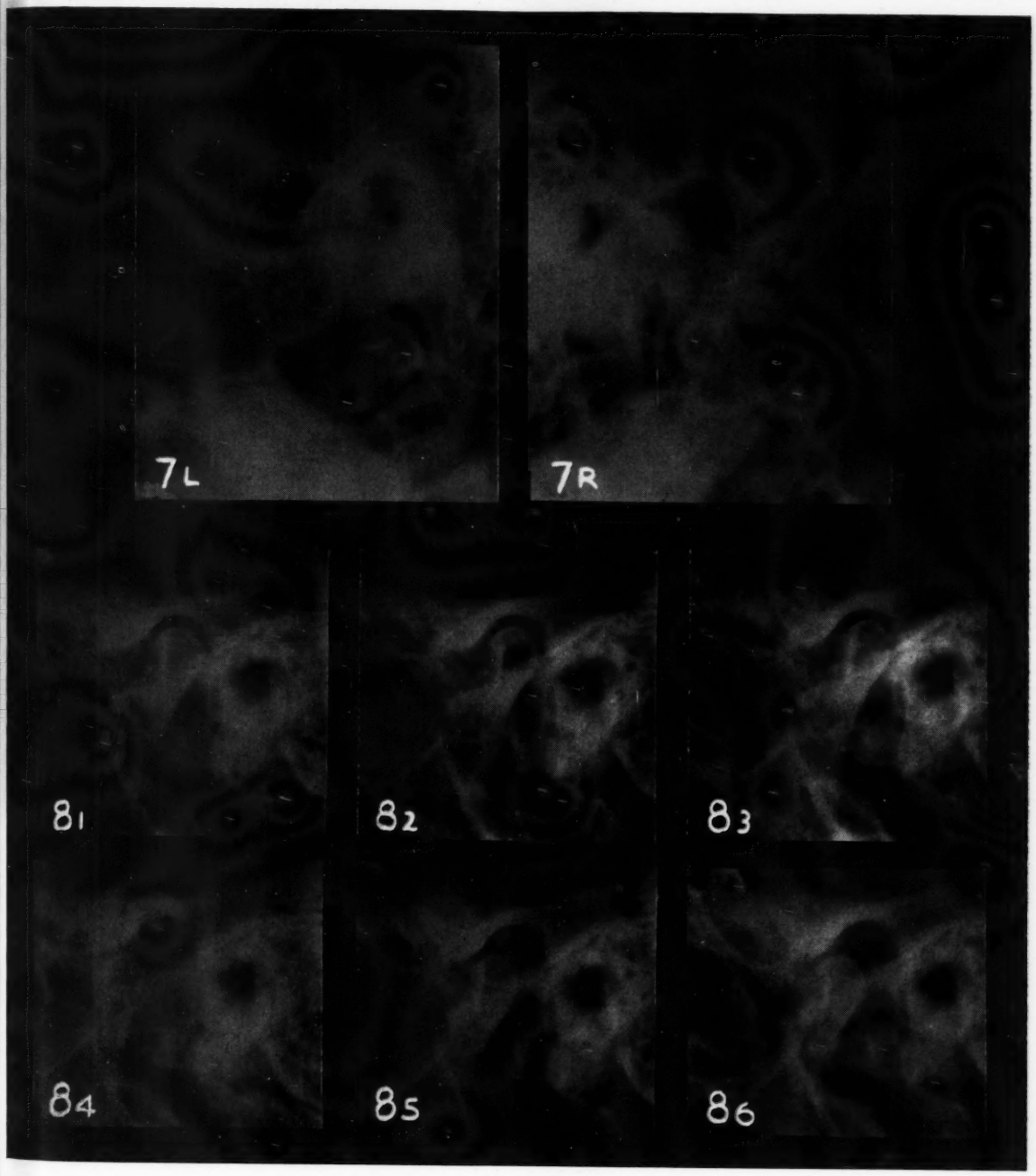
Figure 3—An excellent example of Shapiro's statement is Figure 3. A portrays the condyle in centric, resting in the deep part of the fossa. B portrays the condyle with the jaw dropped open.

Condyle Returned to Centric Position—It is evident that with the mandible in open position the condyle has dropped downward far below the eminentia and has moved forward to a point in front of the eminentia, simulating a dislocation. Although the condyle has moved downward and forward to a point far beyond normal, the muscles experience no difficulty in returning the condyle to centric position in the deep part of the fossa (A).

Overextended Condylar Movement—(1) The patient's occlusion, and (2) the jaw relationship are quite normal. The only manifestation of the overextended condylar movement is a clicking sound during mastication. The reason for the overextension is, no doubt, a superflexibility of the stylomandibular ligament, the checkrein of the mandible.

Exploration of Mandibular Pressure

For the purpose of ascertaining what condylar changes, if any, occur when the jaws exert pressure against a bolus, mandibular pressure was explored:



1. When the mandible drops open to engage a bolus the condyle drops downward out of the deep area of the fossa and moves forward to a point near or under the eminentia.

2. X-rays of the condyle show that pressure on the bolus is exerted without the condyle using the fossa as a fulcrum.

3. It seems possible that the bolus itself becomes the transitory fulcrum,

7. ***X-rays of the glenoid fossae, showing no condyles present within the borders of the right or left fossae.***

8. ***Normal movements of the condyle. No. 1, The condyle with the mandible in centric; No. 2, the condyle with the mandible in retrusive position; No. 3, the condyle with the mandible in working position; No. 4, the condyle with the mandible in open position; No. 5, the condyle with the mandible in protrusive position; No. 6, the condyle with the mandible in balance position.***

dissolving when its function is completed.

Figure 4—Three x-rays were taken illustrating the muscular action that takes place during pressure. All three pictures are of the same condyle of the same patient but under different conditions of stress.

A 20-millimeter bolus was used for the teeth to engage and before each exposure the patient was instructed to

exert as much pressure as possible against the bolus:

1. In picture A the bolus was in the incisal region.

2. In picture B the bolus was in the left molar-bicuspid region.

3. In picture C the bolus was in the right molar-bicuspid region.

Equalization of the Mandible—1. Examining pictures A, B, and C, it becomes evident that no matter at what point the pressure was exerted no appreciable difference can be observed in the position of the condyle in relation to the eminentia.

2. This series of x-rays suggests that no matter which side is under pressure, right or left, the muscles of the opposing side offset the pressure, keeping the mandible in equalized balance.

Development of Theory—1. View A in Figure 5 portrays a fractured condyle that has been depressed down and forward out of the fossa.

2. Picture B shows the same condyle ten months later.

3. Comparing the positions of the two condyles the muscles appear to have pulled the condyle into a more upright position during healing but the condyle is still far from being in the fossa where it belongs.

The Glenoid Fossae

1. In Figure 6 the condyle on the right side can be seen in the fossa in its normal position. The fossa on the left side shows no condyle present within its borders.

2. The patient could open and close, move into protrusion, and move the mandible from side to side laterally with no evident effort and the face at the ten-month period was still symmetrical.

Figure 7—1. In this case both condyles were fractured and depressed downward and forward out of the fossae. The illustration shows the right and left glenoid fossae with no condyle present in either fossa.

2. This patient, also, with no apparent effort, could open and close normally, move into protrusion, and move laterally from right to left. The face was symmetrical at the end of a five-month period and there was good mandibular pressure.

Explanation of the Phenomenon—1. In cases of this kind it appears (1) that nature provides false joints and (2) that the muscles adjust to keep the mandible in equalized balance.

2. Gysi[2] states: "I want you to see that an articular joint may be fixed by muscular action at any stage of its possible motion and become just as much a fulcrum for lever action as if it were a rigid anatomical structure. If I can make this point plain, it will solve one of the greatest difficulties heretofore present in studies of mandibular motion, because it will enable you to understand how a condyle may be fixed in position by muscular force and become the fulcrum for mandibular motion."

The Relationship of Normal Condylar Movements

The next point explored in this study was the normal movements of the condyle in relation to the three basic movements of the mandible: (1) the vertical, (2) the horizontal, and (3) the lateral.

Characteristics of the Mandibular Function

Aspects of Figure 8—1. View Number 1 in Figure 8 shows the condyle with the mandible in centric.

2. Number 2 shows the condyle with the mandible in retractive position.

3. Number 3 shows the condyle with the mandible in working position.

4. During each of these three dissimilar movements of the mandible the condyle stays in virtually the same position in relation to the deep section of the fossa.

5. Number 4 shows the condyle with the mandible in open position.

6. Number 5 shows the condyle with the mandible in protrusive position.

7. Number 6 shows the condyle in balance position.

8. In each of these three dissimilar movements of the mandible the condyle drops downward and moves forward into virtually the same position in relation to the eminentia.

Results of X-ray Studies—The following facts are revealed by study of Figure 8:

1. When the mandible is in function, either one or both of the condyles are out of the fossae.

2. When the jaw is dropped open, both of the condyles are out of the fossae (4).

3. When the mandible is in balance position, one condyle is out of the fossa, (No. 6) and one condyle is in the fossa (No. 3).

4. When the mandible is in protrusive position both condyles are out of the fossae (No. 5).

Muscular Action of Primary Importance—While the movements described are taking place some force must keep the condyles under control and the mandible in equalized balance and this force must naturally be the muscles.

Further Support of Theory of Muscular Control. While the condyles are out of the fossae they certainly can have no influence on occlusion. However, some force must keep the teeth in proper occlusion and the jaw in equalized balance.

Comments

1. Although study in this subject is still in the research stage, two facts become evident: (A) The influence of the condyle has been greatly *overstressed*, and (B) the influence of the muscles greatly *underrated*.

2. At this stage of investigations the radiographic evidence obtained indicates the following phenomena: (1) The movements of the condyle downward and forward and back again, and (2) the lateral and incisal movements are only a *reflection of the muscles as they extend and retract.*

3. Returning to the initial question upon which the analysis in this article is based, it is possible that in the presence of proper interdigitation and correct vertical dimension, occlusion is muscularly controlled, the condyle acting only as the floating pivotal hinge of the mandible at whatever height and from whatever position the muscles dictate.

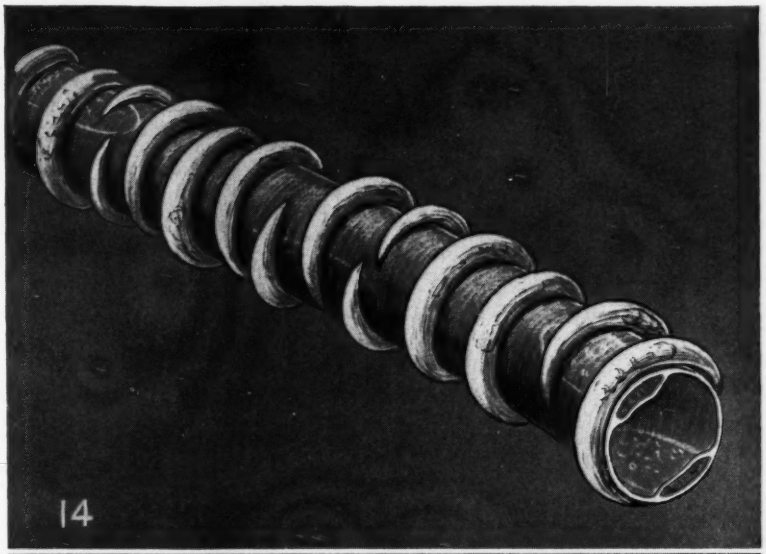
450 *Sutter Street.*

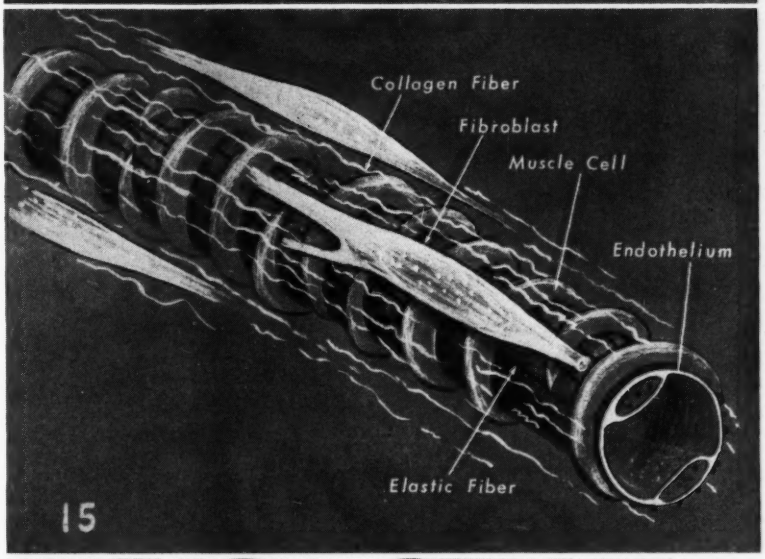
[2]Gysi, Alfred: Studies of the Leverage Problem of the Mandible. Read before the faculty of the College of Dental Surgery, Columbia University, New York, October 6, 1920.

Histology and Dynamics of Capillaries and Arteries

(PART TWO)

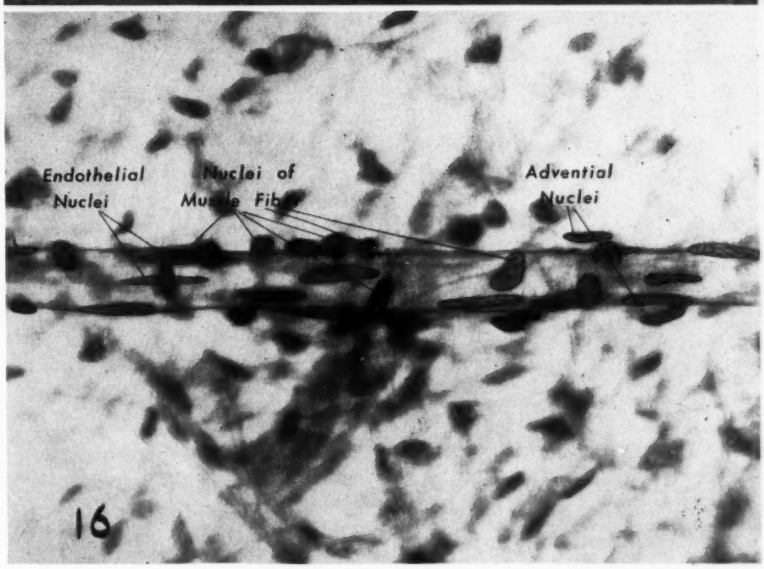
HANS ELIAS, Ph.D., Chicago



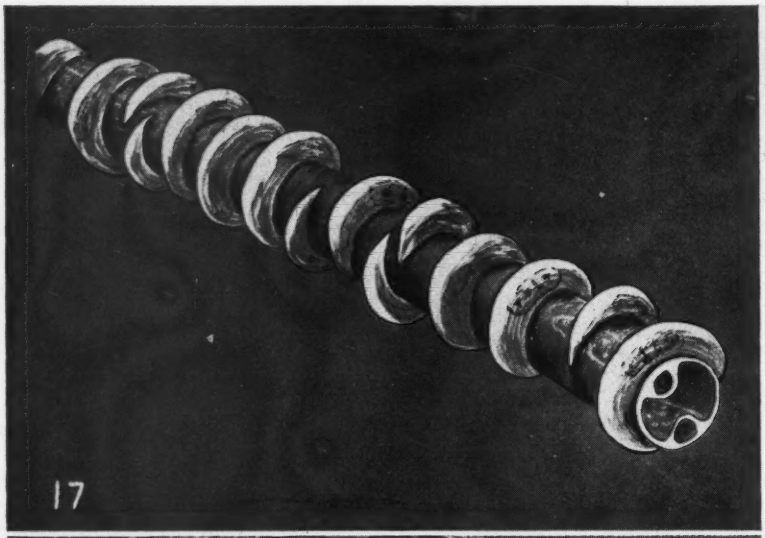


14. *A vessel conducting blood into precapillaries and capillaries is known as an arteriole. In essence, this is a capillary surrounded by one layer of circular, smooth muscle fibers which form a simple tunica media. Endothelium and muscle cells, however, are not the only constituents of an arteriole.*

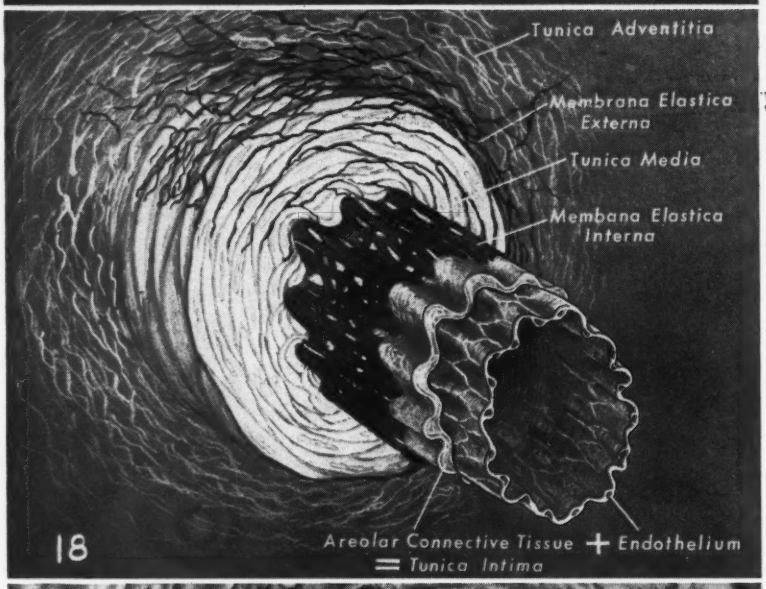
15. *A few longitudinal elastic fibers (drawn black and connected with one another by an almost imperceptibly thin basal membrane) immediately adjacent to the endothelium constitute a simple membrana elastica interna. Connective tissue elements outside the muscular layer form the adventitia.*



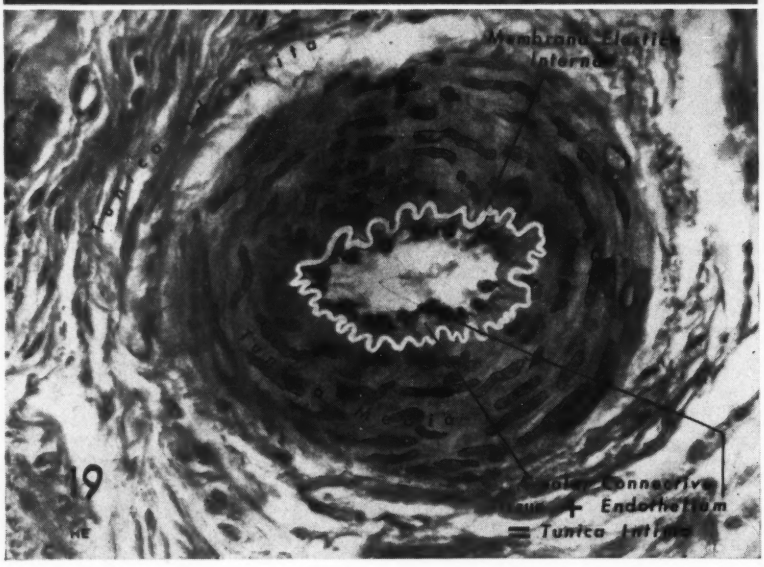
16. *A whole mount of an arteriole in a mesentery, stained with hematoxylin. Longitudinally arranged nuclei pertain to endothelial cells. As the smooth muscle cells of the media are circularly arranged, the nuclei of some of them are seen here in apparently transverse position. The nuclei of others appear in optical cross sections. Longitudinal nuclei outside of the media belong to fibroblasts of the adventitia.*



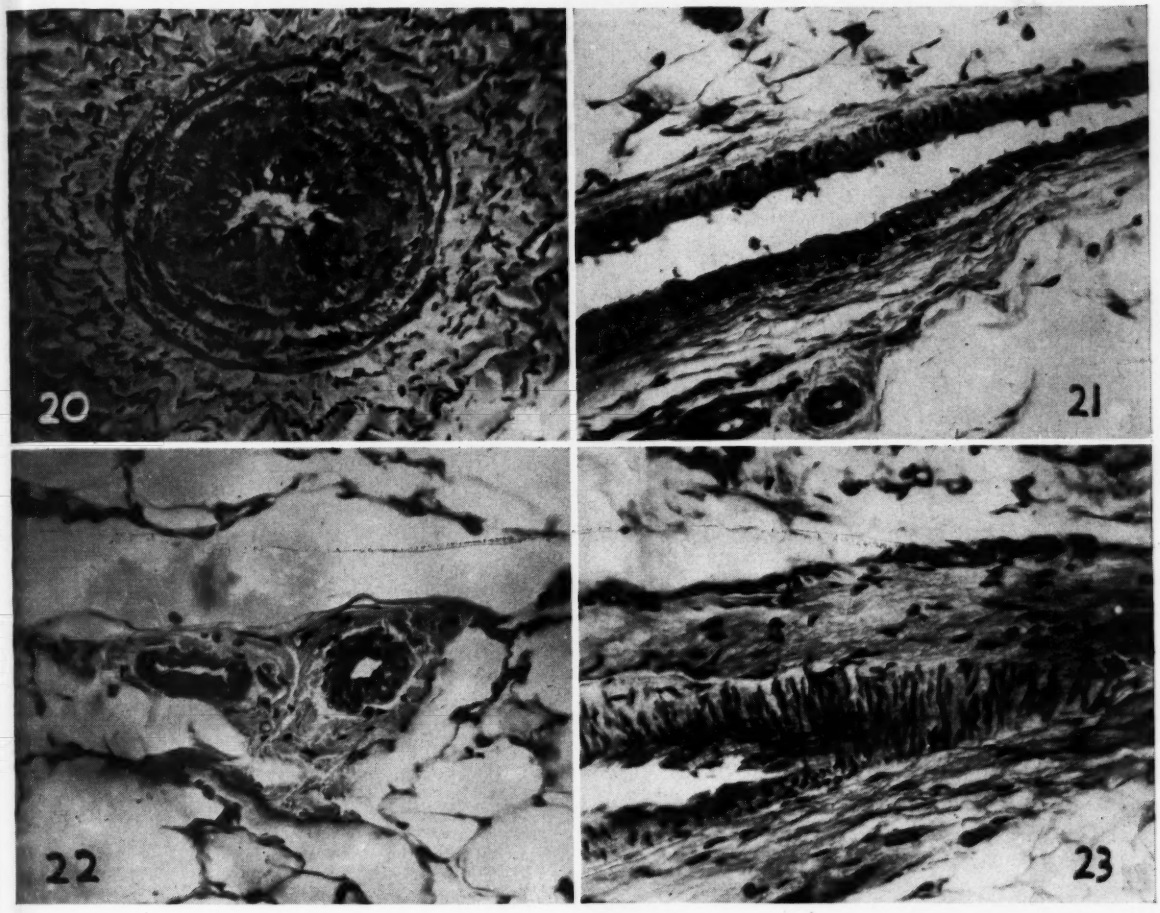
17. *Contraction of the muscle fibers causes narrowing of the vessel and thickening of the endothelium. This action results in reduction of blood flow distally and elevation of blood pressure proximally. The muscular contraction of the tunica media of the blood vessels is influenced by the vasomotor nerves of the autonomic nervous system, by hormones, and by products of the metabolism.*



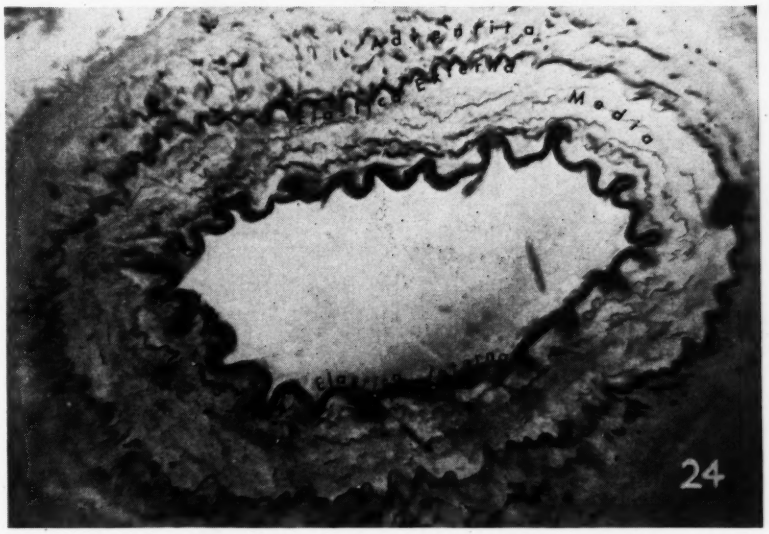
18. *In a medium sized artery all the layers of the blood vessel walls are well developed. Internally, there is the endothelium. Outside of this follows a thin layer of delicate areolar tissue, the amount of which increases with advancing age. The artery shown in Figure 18 is of a man of about 50 years of age. This layer forms, with the endothelium, the tunica intima. The membrana elastica interna of arteries of this size consists, according to Benninghoff, of broad, anastomosing, elastic bands, sometimes of two systems of elastic bands crossing each other. But the membrana elastica interna may be more solid than in this particular case. The tunica media is thick and consists of circular, smooth muscle cells. These are intermingled with elastic fibers, illustrated only in the upper area. Outside of the media is a condensed network of elastic fibers, known as the membrana elastica externa. This layer blends with the tunica adventitia which consists of fibrous connective tissue. This outermost layer of the arterial wall blends into the surrounding connective tissue. In most cases the tunica media has a well-defined peripheral surface appearing in sections as an outline. But in some cases (Fig. 20) it is loosened peripherally, so that isolated smooth muscle fibers can be seen in a zone common to both the media and the adventitia.*



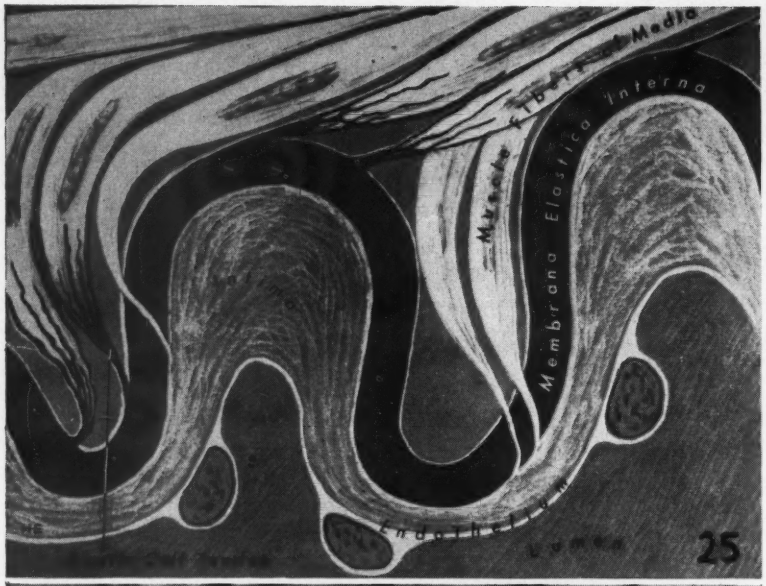
19. *All the layers of the artery can be recognized in histologic sections.*



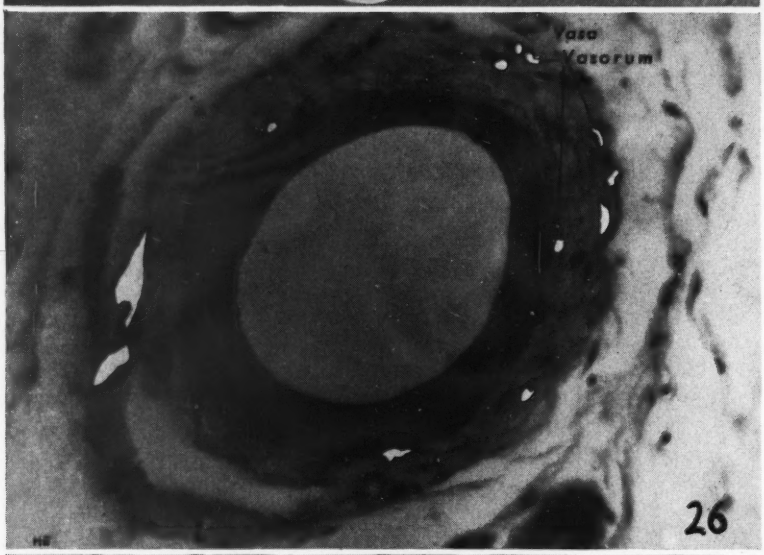
20, 21, 22, and 23. *For those familiar with the arrangement of the layers it is easy to interpret sections of arteries. Figure 20 shows a cross section with an unusually loose arrangement of the outer muscle fibers of the media. Figure 21 is a longitudinal section of an artery. Note the longitudinal arrangement of the endothelial nuclei and the cross sections of the muscle fibers of the media. The fibroblast nuclei of the adventitia run longitudinally. Figure 22 shows one transverse and one oblique section of two small arteries, to visualize how these arteries were located during life. Figure 23 shows an oblique section of an artery. Where the media is cut tangentially, the muscle fibers appear in longitudinal section. All these sections are photographed at the same magnification. They are from specimens of human skin.*



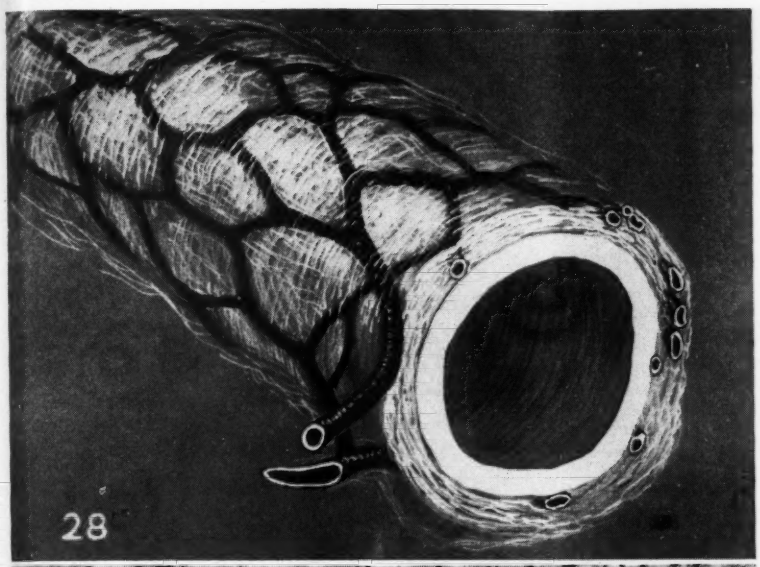
24. *When stained with resorcin fuchsin the elastic elements are seen clearly. The elastica interna is frequently corrugated. The degree of corrugation is controlled by the contraction of the muscle fibers, some of which are attached at one end to the inner elastic membrane (Fig. 25). The media contains thin, elastic fibers. The elastica externa is a condensation of elastic tissue and the adventitia also contains elastic fibers. Black dots in this photograph are cross sections of longitudinal, elastic fibers.*

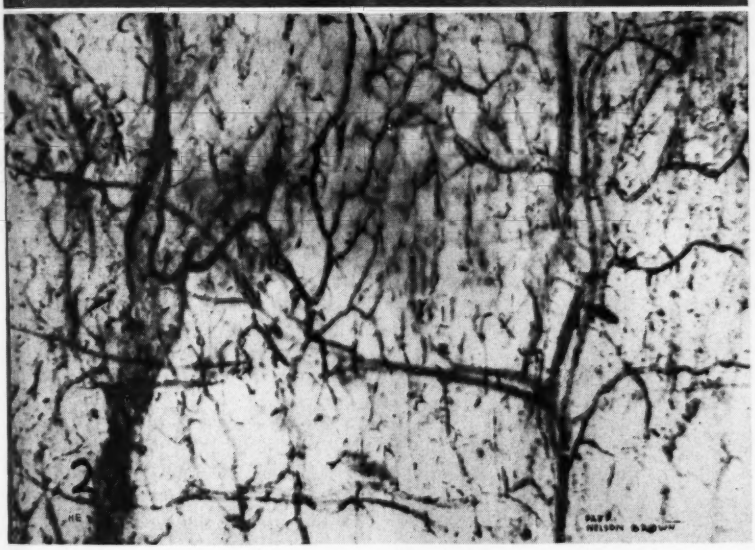


25. *Some muscle fibers of the media are attached to the elastica interna by means of elastic cell tendons. Other muscle fibers pierce the elastica interna and spread out slightly on its intimal side. The contraction of these muscle cells controls the corrugations of the elastica interna. This diagram is based on Benninghoff's observations (1927).*



26 and 27. *When the muscle fibers of the media are relaxed (Fig. 26) the media is relatively thin, the elastica interna is straightened out, the lumen of the artery is wide. Strong contraction of the muscle cells of the media (Fig. 27) thickens the media, causes extreme corrugation of the elastica interna, thickening of the intima, protruding of the endothelial nuclei, and narrowing of the lumen.*





28. ***The wall of blood vessels of medium and large size has its own blood supply through the network of the vasa vasorum. Sections of the vasa vasorum shown stereogrammatically in Figure 28, are seen in the photomicrographic Figure 26. Two such vessels are also seen in Figure 19.***

29. ***Vasa vasorum in the wall of the aorta of a guinea pig, injected with India ink. The aorta has been opened and spread flat on a slide. (Preparation by Nelson Brown).***

(End of Part Two)

Retention of Fluorine from Bone

JACKSON[1] and his co-workers cite two instances in which bone has been used as a large scale source of supplementary calcium in the human diet:

1. The addition of cooked bone to canned meat products. During and immediately after the last war a large proportion of the canned meat products prepared in Canada for U.N.R.R.A. contained 15 per cent of cooked ground bone.

2. The addition of 0.5 per cent bone meal to all the flour sold in Newfoundland. This use of bone raises the question of the availability of its calcium and also of the amount and retention of the fluorine in edible bone products.

Review of Comparative Investigations

1. Quoting from a report by Greenwood the authors say that in puppies receiving sodium fluoride dental fluorosis developed. This abnormality did not develop when the fluorine supplement was in the form of bone meal. The teeth were better in those animals receiving bone meal.

2. Extensive studies revealed that veal bones had less than one tenth as much fluorine as beef bones. Pork bones had an intermediate concentration.

3. The fluorine retained from sodium fluoride varied directly with the total fluorine ingested. The proportion of fluorine retained from added bone decreased as the amount ingested increased.

4. When rats were fed at a level of 0.6 milligrams per hundred cubic centimeters, the retention of ingested fluorine was the same when added as either sodium fluoride or pork or beef cooked bone.

5. The retention when added as veal bone was only one-fourth to one-third that of sodium fluoride. The retention when added as bone meal was less than when added as cooked ground bone.

6. Retention of fluorine in adult rats was lower than in young growing rats.

7. The concentration of fluorine in rats' incisor teeth bears a constant relation to its concentration in the rest of the carcass.

From Current Medical Literature, *Journal of the American Medical Association* **143**:1281 (August 5) 1950.

[1]Jackson, S. H.; Tisdall, F. F.; Drake, T. G. H.; and Wightman, D.: Retention of Fluorine when Fed as Bone and as Sodium Fluoride, J. Nutrition, **40**:515 (April) 1950.

Successful Full Dentures

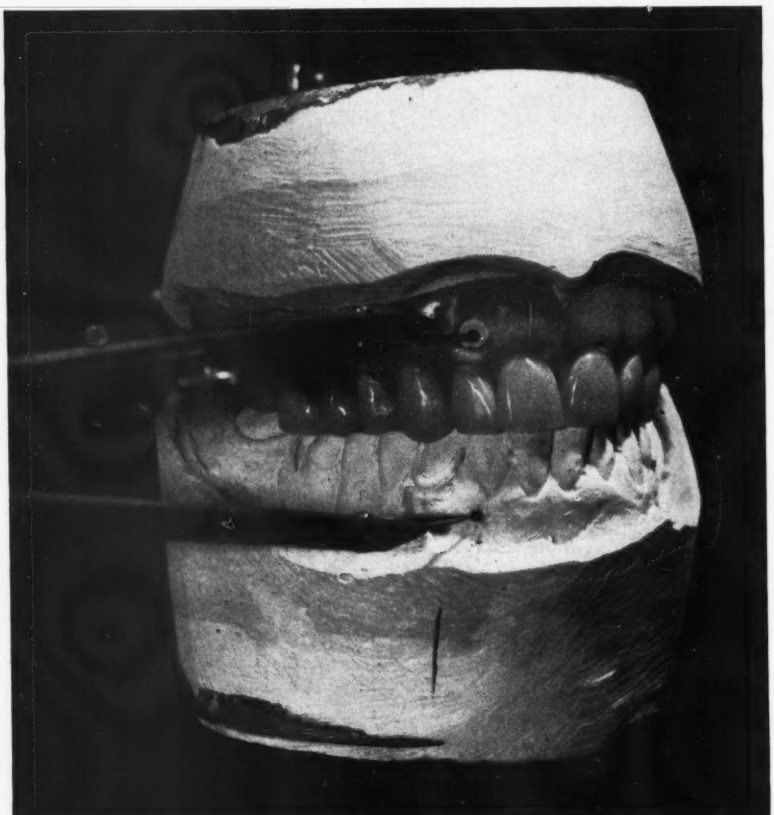
Through Accurate CENTRIC OCCLUSION

MEYER M. SILVERMAN, D.D.S., Washington, D.C.

DIGEST

In this method of recording the patient's normal centric occlusion for use in transferring an accurate centric occlusion to newly made dentures indelible or tattoo dots on the gingival tissue are used to record the vertical dimension.

It is a simple matter to transfer this measurement to newly-made dentures. The procedure described is an accurate and practical method for measuring the intermaxillary space and will eliminate most of the failures in full denture construction that are caused by over opening the bite.



1. ***Centric occlusion measurement between tattoo dots on upper and lower gingival tissue. Note hole cut into upper old denture to make dot on upper gingiva. This hole provides the means of measuring between dots on upper and lower gingivae.***

Taking the Bite

The most important step in full denture construction is that of registering the bite. According to Porter[1] "The establishment of correct vertical jaw relation is probably the most perplexing problem in complete denture construction."

Young[2] states that 90 per cent of the failures in full denture construction are due to the failure of obtaining the proper centric relation. A review of the failures of full dentures would reveal that Young's statistics are correct.

A Three-Dimensional Procedure—Taking the bite involves the following procedures: (1) The mesiodistal relationship of the teeth and jaws. (2) The buccolingual relationship. (3) The vertical relationship of the teeth and jaws.

Problems—1. The problem of the first two relationships of the jaws; namely, the mesiodistal and buccolingual dimensions, can be simplified by the use of the nonanatomic flat posterior teeth. Sears[3] shows the detrimental effects of the inclined planes of cusped teeth and the physical advantage of flat surfaces present in nonanatomic teeth.

2. Vertical dimension must be determined as accurately as possible in order to ensure the success of full dentures.

Survey of the Cause of Defects in Full Dentures

By reviewing the causes of failure in many full dentures it can be proved that the establishment of accurate

[1]Porter, Chastain G.: Vertical Relation, the Enigma of Complete Denture Construction, Dental Survey **26**:806-808 (June) 1950.
[2]Young, Harry Allen: Diagnosis of Problems in Complete Denture Prosthesis, J.A.D.A. **39**:185-200 (August) 1949.
[3]Sears, Victor H.: Principles and Technics for Complete Denture Construction, Figure 72 and Figure 73, St. Louis, C. V. Mosby Co., 1949.

2. ***Measurement between tattoo dots. Note open labial flange of bite-rim to expose the dot on the gingiva. This measurement can be checked with the first measurement when the old denture is in place in centric occlusion, as shown in Figure 1.***

centric occlusion is probably the most important phase of full denture construction.

In immediate dentures fewer difficulties are encountered than in later replacements. Tench[4] has pointed out the ease with which immediate dentures are worn when the natural vertical dimension is accurately copied.

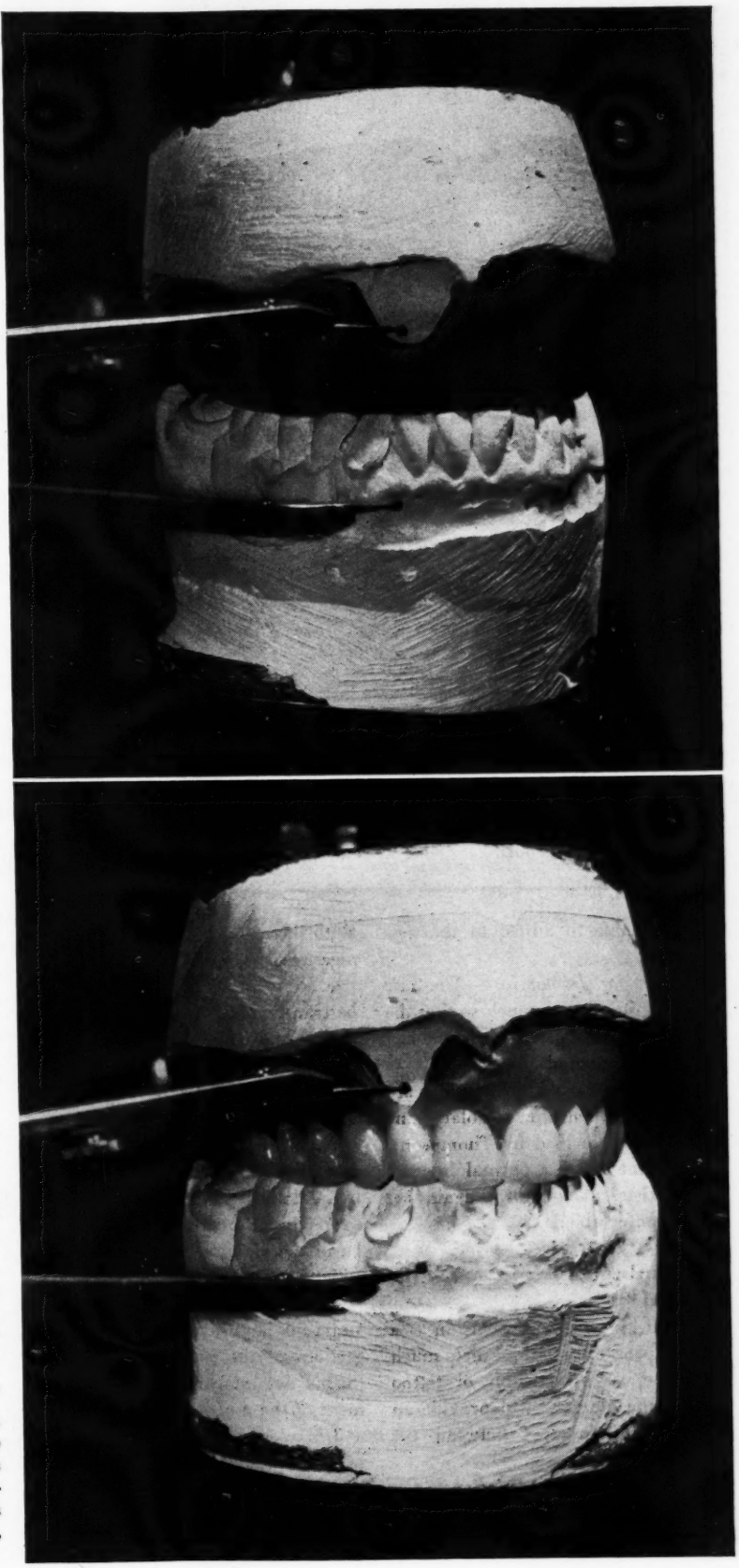
When immediate full dentures are constructed with *no* opening of the bite, maintaining the patient's centric occlusion as found in the natural teeth, they are generally comfortable and are seldom removed by the patient.

Frequently, when the first set of teeth is replaced by more closely fitting dentures with excellent retention and esthetics, the patient is uncomfortable and does not adjust to the new dentures. The reason for this is that the bite was opened too much. When the dentures are reconstructed with a closer bite the patient is again comfortable.

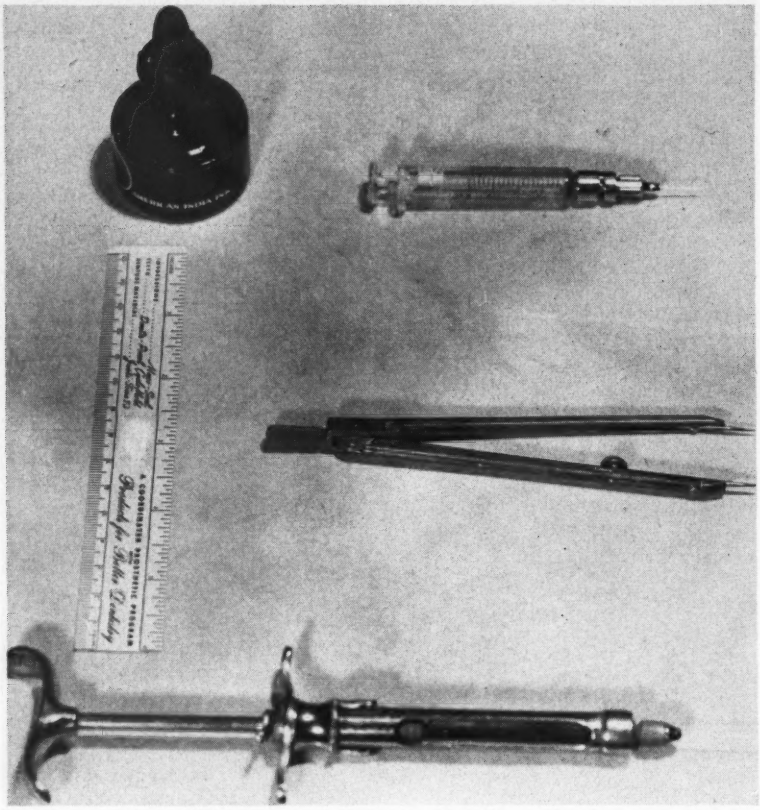
Old Dentures Worn with Comfort—In many cases vulcanite dentures worn for twenty or thirty years no longer fit the ridges. The patient claims that the old dentures are perfectly satisfactory but he wishes to obtain new dentures that are more hygienic and more esthetic.

Replacement is Uncomfortable—The new dentures are constructed by modern methods from the newest and most attractive materials, and possess suction and fit that the patient has never before experienced. However, the patient has repeated sore spots

[4]Tench, R. W.: Dangers in Dental Reconstruction Involving Increase of Vertical Dimension of Lower Third of Human Face, J.A.D.A. 25:566-570 (April) 1938.



3. ***Measurement between tattoo dots. Note open labial flange of wax setup to expose dot. This measurement can be checked for accurate centric occlusion when the old denture is in place in its natural centric occlusion, as shown in Figure 1.***



4. ***Armamentarium consisting of India ink, Luer syringe with round opening needle, millimeter rule, dividers, and local anesthetic used in making and measuring the tattoo dots.***

and is unable to adjust to the new dentures.

Reason for Discomfort—The bite has been opened too much so that the normal freeway space is encroached upon or eliminated.

Correction—When the dentures are remade or when the alveolar bone resorbs, as described by Thompson,[5] to the point where a normal freeway space exists, the dentures again become comfortable.

Measuring Centric Occlusion

Establishing centric occlusion is a difficult procedure and requires much skill. The use of indelible or tattoo dots on the gingivae will provide an accurate measurement between the upper and lower jaws.

Transferring the Relationship—With these marks the distance can be measured when the patient is in centric occlusion. The measurement can be transferred to new dentures maintaining the same vertical relationship and eliminating failures from accidentally or inadvertently opening the bite.

Replacing a Full Upper Immediate Denture—1. Cut a hole through the labial flange of the old upper denture, exposing an area on the upper gingiva in the vicinity of the right lateral (Fig. 1).

2. Using a Luer syringe and needle, India ink is pushed into the hard epithelium of the gingival tissue, close to, but not into, the muscular attachment of the mucobuccal fold.

3. To avoid bathing the denture with ink diluted with saliva, an indelible pencil may be used to mark the tissue at the center of the hole in the labial flange. Remove the denture and inject on the indelible pencilled dot to make a permanent indelible tattoo mark.

4. A similar tattoo mark is placed on the lower hard tissue, just above the muscular attachment of the mucobuccal fold, in the vicinity of the lower right lateral incisor. This dot will be parallel to the upper dot on a vertical line.

5. With the use of dividers the distance between these two dots can be measured (Fig. 1). The number of millimeters should be recorded on the patient's card.

6. After the distance in millimeters is recorded it is advisable to repair the hole in the labial flange of the old denture with a repair material. If acrylic is used the hole can be repaired and the acrylic allowed to harden while the bite is being taken.

7. These dots should remain on the patient's hard tissue permanently. The distance between them, when the patient is in centric occlusion, can always be checked. The distance of 21 millimeters between dots in a particular case became the basis for determining the proper vertical measurement of the bite-rims (Fig. 2).

A Means of Comparison—In the same manner, the wax-up of teeth for the second or new denture (Fig. 3) can be compared and checked to the measurement between the dots while the old denture is in place (Fig. 1).

If there are any discrepancies, the vertical dimension can be opened or closed to compare favorably with the measurements of the old denture (Fig. 1).

The Problem of Opening the Bite

1. If the esthetics of the first set of teeth are satisfactory and the freeway space is between 1 and 3 millimeters, the bite should not be opened as it might prove dangerous according to Mershon,[6] Tench,[4] Schuyler.[7] The vertical dimension in the second set should be reproduced exactly as it is in the first set of teeth by the use of

[5]Thompson, John R.: The Rest Position of the Mandible and Its Significance to Dental Science, J.A.D.A. **33**:151-180 (February) 1946.

[6]Mershon, J. V.: Possibilities and Limitations in Treatment of Closed Bites, Internat. J. Orthodontia **23**:581-599 (June) 1937.

[7]Schuyler, C. A.: Problems Associated with Opening Bite which would Contraindicate it as Common Practice, J.A.D.A. **26**:734-740 (May) 1939.

the indelible dots and the recorded centric occlusion measurements between them.

2. If there is any doubt whether the bite should be opened slightly to compensate for possible shrinkage of tissue since the teeth were extracted, it is better to keep the bite on the closed side, provided esthetics and comfort will permit it.

3. For example, if the bite is over opened 1 millimeter, within a year or two it is shown by Thompson[5] that the bone will resorb 1 millimeter to provide normal freeway space for that patient.

4. It has been the author's experience during the try-in of the waxed teeth that the opening of the bite by even 1 millimeter caused the patient to doubt the comfort of the setup. However, closing the bite just 1 millimeter to the exact measurement of the first set of dentures proved immediately that the replacement was comfortable and satisfactory.

Armamentarium

The items shown in Figure 4, used in making and measuring the indelible or tattoo marks are: 1. Local anesthetic. 2. Black India ink. 3. Luer syringe. 4. A 23-gauge round opening needle. 5. Dividers. 6. Millimeter rule.

Method of Use of India Ink—The black India ink used is the waterproof drawing ink obtainable in any stationery or artists' supply store. A small amount is aspirated into the needle with a slight overflow into the Luer syringe and pushed well into the anesthetized surface at the points described.

Constructing the Needle—The proper type of needle is not manufactured and must be made by removing the bevel of a 23-gauge needle with sandpaper discs and resharpening the end with a continuous bevel around the circumference by means of the finest cut discs or a mounted Arkansas stone.

Dividers Easily Obtainable—A pair of dividers can be obtained from a stationery or draftsmen's supply store. The distance between dots as shown by the dividers should be measured on a millimeter rule.

A Small Permanent Dot is Formed—By using the plunger of the syringe pressure is maintained during the injection of the needle into the epithelial tissue so that a small amount of India ink is placed well into the tissue to form a small permanent dot. Care must be taken not to inject into the muscular mucobuccal tissue as this will sometimes cause a diffusion of the ink.

Summary

1. A method of recording and transferring centric occlusion to a new set of dentures by means of indelible or tattoo dots is presented.

2. Indelible or tattoo dots can be placed on both upper and lower anterior tissue on the hard epithelium just away from the muscle attachment of the mucobuccal fold to provide the means to measure and record permanently the distance between the dots while the patient's jaws are in centric occlusion.

3. Dots on the gingival tissue of patients where all the teeth are present are the means of transferring the same relationship of the jaws during centric occlusion, after the loss of the natural teeth, to artificial dentures.

4. Patients with satisfactory vertical dimension in old full dentures can have new full dentures constructed with exactly the same vertical dimension by the use of dots on the gingival tissue.

5. A closed bite caused by shrinkage of the tissue during the use of full dentures can be restored to its normal centric occlusion by comparing the recorded measurement between the dots when the patient maintained the natural centric occlusion.

6. The opening of the bite can be controlled to the exact millimeter in patients with a full complement of teeth by measuring between dots during centric occlusion before and after bite raising with fixed or removable restorations and orthodontic treatment.

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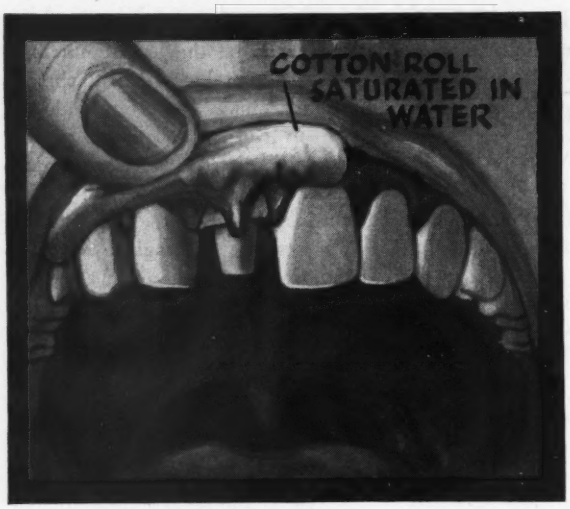


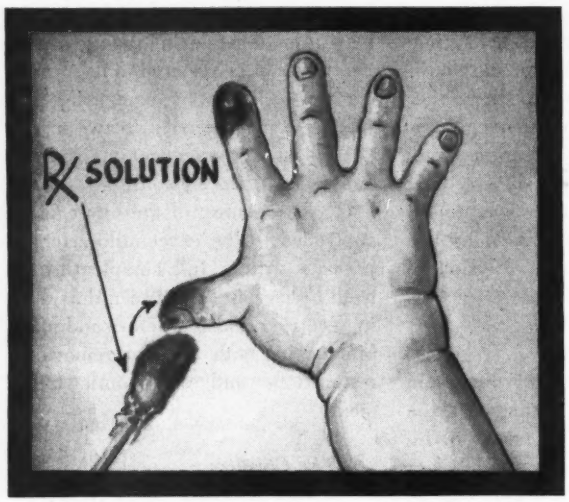
1

Clinical and Laborato

Keeping Teeth Moist While Operating

A. D. Singer, D.D.S., Wilmington, Calif.

1. Saturate a cotton roll in water and place it under the lip. When operating on an upper anterior tooth press on the roll. The water that is expressed will drip over the tooth and tend to keep it cool.

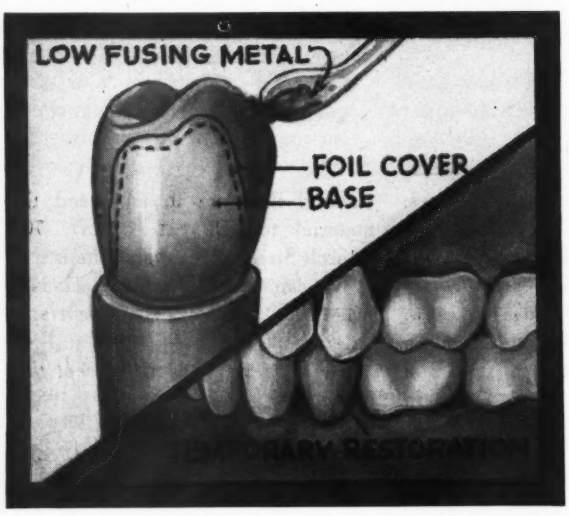


2

Solution to Prevent Thumb Sucking

William P. Humphrey, D.D.S., Denver

2. An effective preparation to discourage thumb sucking and nail biting is composed of tincture of capsicum, 4 parts; asafetida, 4 parts; and collodion, 3 parts. The preparation is painted on the child's thumb or nail 3 times a day.



3

A Temporary Metal Restoration

Samuel Silver, D.D.S., Chicago

3. Adapt a piece of tin foil to a model of the prepared tooth. With a hot spatula add molten low fusing Melotte's metal and build up the restoration to the desired contour and occlusion. Trim the margins and make the surface smooth. Use a thin mixture of zinc oxide and eugenol for temporary cementation.

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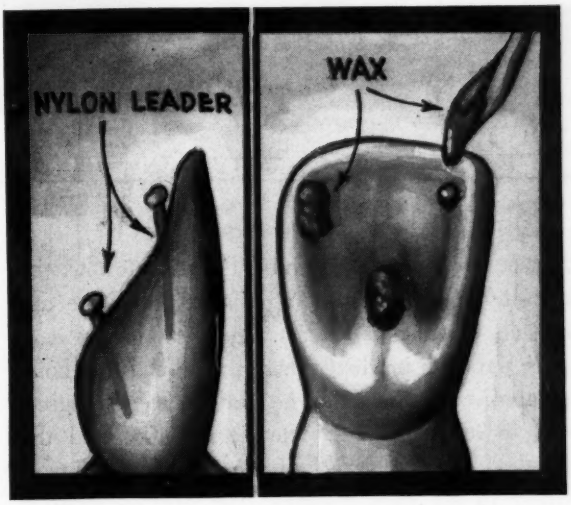
SUGGESTIONS . . .

Plastic Pins for Pinledge Preparations

Austin P. Hutchinson, D.D.S., St. Petersburg, Fla.

4. Cut pieces of 15-pound nylon fishing leader into 5-millimeter lengths. Flame one end of each strip to a ball shape. Insert a piece into each of the holes in a pinledge preparation. Flow wax over the balled end. Complete the pattern. The nylon pieces will be dissipated with the wax during the burn-out.

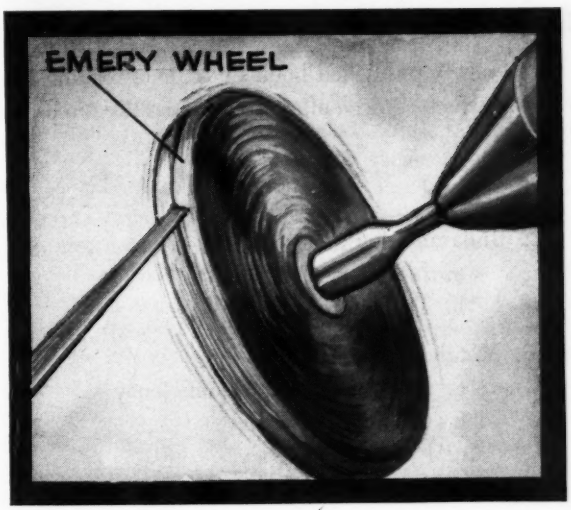


4

Resurfacing an Emery Wheel

Clyde E. Blattman, Cincinnati

5. Hold a piece of thin steel against the revolving emery wheel. This will abrade the wheel and produce a new, smooth, and even cutting surface.

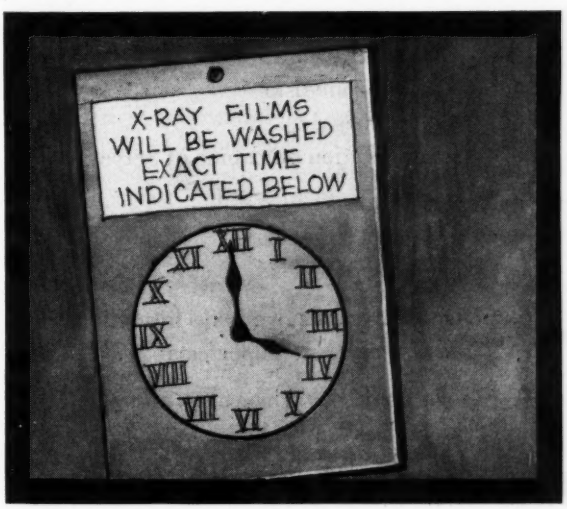


5

An Indicator for Film Processing

F. E. Morton, D.D.S., Silver City, Mexico

6. Use a discarded "Doctor is In" sign. Adjust the hands to the proper time. (Films should be washed 30 or more minutes). Hang the sign in a convenient place; it will serve as a reminder of the time when the films should be removed from the water.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time.

Turn to page 508 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S *Page*

WHATEVER SPECIALTY the dentist may follow, the anatomy, physiology, and pathology of bone are subjects of concern to him. The orthodontist may place the teeth in ideal relationship but if the bone metabolism is disturbed he may expect a regression in his treatment. The periodontist and the prosthodontist in the face of bone degeneration may expect to see case failures. The oral surgeon is constantly faced with the destruction of bone continuity in fractures and with pathologic processes involving bone tissue.

In a newly published book Luck[1] mentions those etiologic factors accountable for the reduction of bone density:

1. Disuse
2. Inflammation
   a. Infection
   b. Trauma
3. Metabolic disturbances
   a. Vitamin C and D deficiency
   b. Calcium deficiency
   c. Protein deficiency
   d. Senile osteoporosis
4. Glandular unbalance
   a. Hyperparathyroidism
   b. Hyperthyroidism
   c. Basophilism
   d. Hypogonadism
   e. Acromegaly
   f. Adaptation syndrome of Selye
5. Nephritis
   a. Renal rickets
   b. Renal acidosis
6. Congenitally defective bone formation
   a. Osteogenesis imperfecta
7. Neurotrophic disturbances
   a. Sudeck's atrophy
8. Chemical ingestion
   a. Strontium
   b. Magnesium
9. Gastrointestinal disturbances
   a. Biliary and pancreatic fistulas
   b. Sprue
   c. Streatorrhea (idiopathic)
10. Idiopathic diseases
    a. Paget's disease

Osteoporosis (Deossification)

(*Disturbances of protein metabolism and osteoblastic function*)

1. Disuse (bed-fast)
2. Protein deficiency (malnutrition)
3. Basophilism (Cushing's syndrome)
4. Hyperthyroidism
5. Post-menopausal syndrome
6. Acromegaly
7. Alarm reaction of Selye
8. Osteogenesis imperfecta
9. Chemical ingestion (strontium, magnesium)
10. Senility
11. Vitamin C deficiency (scurvy)

Skeletal Malacia (Osteomalacia)

(*Disturbances of calcium metabolism*)

1. Vitamin D deficiency rickets and osteomalacia
2. Calcium deficiency rickets and osteomalacia
3. Renal rickets and renal acidosis
4. Primary hyperparathyroidism

In the same excellent book Luck quotes Greig, setting down this basic summary of the changes in bone density that are associated with the blood supply:

1. *Adequate*=physiologic circulation. No bone change.

2. *Increased blood supply*=rarefaction, decalcification, and osteoporosis.

3. *Decreased blood supply*=consolidation, increased density, and osteosclerosis.

4. *No blood supply*=necrosis.

[1]Luck, J. Vernon: Bone and Joint Diseases, Springfield, Illinois, Charles C Thomas, Publisher, 1950, pp. 29-39.

MEDICINE and the Biologic Sciences

Barbiturate Addiction

The belief that the barbiturates are not addicting is usually based on the supposition that no abstinence symptoms occur after abrupt withdrawal of barbiturates from a person who has been chronically intoxicated with these drugs. This belief is now known to be erroneous. Even if physical dependence did not occur, chronic barbiturate intoxication produces great harm (1) to the person and (2) to society.

From a physical point of view addiction to barbiturates is more undesirable than is addiction to any of the opiates. It is not known whether barbiturate addiction represents as severe an emotional catastrophe as does opiate addiction.

The effects of the barbiturates are somewhat similar to those of alcohol and frequently both alcohol and barbiturates are used together. Both produce a short-lived relief from emotional tension which, to people with susceptible personalities, seems to offer a solution for many of life's difficulties. Some persons who use barbiturates appear to be motivated by a desire for complete unconsciousness.

These addicts usually prefer nembutal, seconal, and amytal. The drugs are usually taken orally but some addicts will dissolve the contents of the capsules and inject them intravenously. The manner in which the drugs are used varies greatly. Many people indulge in debauches of a few days duration; others take the drugs continuously for periods of months or even years. The amount taken also varies over a wide range but most chronic habitues probably take between 0.5 to 2.0 grams of the drug daily. Users are so confused by the drug that they frequently do not know how much they have been taking.

The symptoms and signs of chronic barbiturate intoxication are predominately those of cortical depression and of cerebellar dysfunction. Cortical depression is manifested by (1) difficulty in thinking, (2) inability to perform simple calculations and psychometric tests, and (3) confusion, somnolence, and defective judgment. Cerebellar dysfunction manifests itself in neurological disturbances. The pulse, blood pressure, and respiratory rate are not significantly changed. Body temperature may be slightly lowered. Little, if any, tolerance develops to any of these effects.

When several doses of a barbiturate drug are taken daily, cumulation of the effects occurs. The degree of the effects of the same dose varies greatly in the same person from day to day. This variation, like the variation in the effects of alcohol, is partly related to food intake. The effect of a barbiturate is much greater if the drug is ingested while the stomach is empty.

Chronic barbiturate intoxication always causes marked social and emotional deterioration. Addicts neglect their personal appearance and are usually unable to work or care for themselves adequately. They frequently smoke in bed and may start serious fires. Their behavior appears to be influenced to some degree by their basic personality make-up and by the mood prevailing on a given day.

Severe symptoms do occur after abrupt withdrawal of barbiturates from chronically intoxicated persons. Even a reduction of 20 to 50 per cent may cause symptoms.

Constant medical care is necessary during the recovery period as the symptoms may be varied and dangerous. Recovery appears to be complete. If any permanent anatomic damage remains, it is so slight as to be undetectable by the usual clinical and psychologic tests.

Isbell, Harris: Manifestations and Treatment of Addiction to Narcotic Drugs and Barbiturates, M. Clin. North America **34**:425-438 (*March*) 1950.

Value of Enteric-Coated Aspirin

Aspirin is used extensively because of its analgesic value. In the treatment of certain rheumatic disorders, maximal dosage over long periods of time is frequently necessary if optimal control of pain is to be attained.

In some persons there is a local irritation of the gastric mucosa from aspirin. This may be true also when aspirin administered for the relief of pain from an acute condition. The following distressing symptoms result: (1) heartburn, (2) nausea, (3) epigastric fullness and pain, (4) anorexia, and (5) vomiting. In rare instances hematemesis occurs.

In an attempt to avoid these symptoms an aspirin tablet with an enteric coat has been used quite successfully. This coat resists dissolution in the stomach and thereby prevents actual contact between the drug and the mucous membrane.

The time of appearance of the aspirin in the urine is only slightly delayed as compared with that of ordinary aspirin. The analgesic effect is generally apparent in twenty to forty minutes. Observations indicate that the enteric coat does not materially alter the fundamental pharmacologic effects of the acetylsalicylic acid.

Most persons who are troubled by aspirin find some degree of relief

when soda or food is taken with the aspirin. These persons invariably prefer the enteric-coated tablet because of the convenience and greater efficiency resulting from increased tolerance.

No instances of melena or hematemesis have been observed following the administration of the enteric-coated tablet. The enteric-coated tablet is recommended in patients with peptic ulcer who frequently are unable to take aspirin without increased gastric distress.

Dentists who prescribe aspirin should use the enteric-coated tablet when indicated. Following surgery, when the patient is not too comfortable, the use of enteric-coated tablets will avoid the possibility of distress.

Talkov, Robert H.; Ropes, Marian W.; and Bauer, Walter: The Value of Enteric-Coated Aspirin, New England J. M. **242**:19-21 (*January*) 1950.

G-11 Skin Germicide

Scrubbing for surgery is a time-consuming and tedious task. Many attempts have been made to produce a germicidal soap or other agent which would satisfactorily cleanse the skin and at the same time materially reduce the bacterial flora. These attempts have not been wholly successful.

A comparatively recent development in germicidal soaps is the use of a compound, G-11. The Council of Pharmacy and Chemistry of the American Medical Association has recognized the name, hexachlorophene, as the generic term for G-11.

Under certain conditions G-11 greatly reduces the bacterial flora of the skin over a prolonged period of time. It appreciably reduces the time for the preoperative scrub and eliminates the necessity of scrubbing with the brush. It also eliminates the necessity for the use of the after-rinse of alcohol, iodine, or agent of choice.

Bacterial flora of the skin have been classified as "transient" and "resident." The presence of transient bacteria is accounted for by the surface contact of the skin with objects in the environment. These bacteria are relatively easy to remove from the skin, being readily taken off by washing with soap and water. The resident flora is found on the human skin irrespective of contact contamination. They are not easily removed by ordinary washing.

Staphylococci, harmless as well as harmful, make up the main part of the resident flora of the skin. Ordinary toilet soap is without effect against these bacteria. G-11 shows great promise as an agent, which incorporated into a soap and used for a period of time of from one to three minutes, will reduce the bacterial flora of the skin to a level unheard of by the use of ordinary soap or by the combination of ordinary soap with other chemicals.

Hexachlorophene for a single isolated scrub is not satisfactory. The single scrub produces little greater reduction in the bacterial flora of the hands than does an ordinary nonmedicated soap. The practical application lies in the frequent, repeated use of 1 to 3 per cent hexachlorophene soap for from one to three minutes several times a day for at least five days a week. This procedure reduces and maintains the bacterial flora of the skin to about 5 per cent of the usual number.

Article: Hexachlorophene (G-11) As a Skin Germicide, Bull. Am. Soc. Hosp. Pharmacists **6**:No. 2 (*March-April*) 1949.

Facial Clefts

Until recently it has usually been taught that it was necessary to correct cleft lip and palate defects by surgery at as early an age as the infant could tolerate the operation. The objectives to be obtained were: (1) to separate nose and mouth cavities so the child could develop normal breathing habits, (2) to prevent return of food through the nose and promote easier feeding, (3) to establish physiologic aeration of the nose to assure development and minimize middle ear infection, and (4) to improve the appearance of the face.

A discouragingly large percentage of patients operated on early have an unsatisfactory result at puberty from (A) a functional or (B) a cosmetic point of view. This is true despite the fact that all or most all of the objectives were attained at the time of the operation.

In the face there is a generalized growth on all surfaces of all bones until the fifth year. After this, growth is limited to specific sites. The growth in both the maxilla and the mandible is so integrated that the total pattern remains stable from birth to adulthood. Congenital deformities behave in an identical manner, the distortion or disproportion becoming no worse unless a growth site is permanently affected.

A comparison of patients operated upon with others not operated upon indicates that surgical interference causes similar changes in the maxillary area. The degree of the deformity depends on the extent of surgery and the time of its performance.

The forward development of the face depends on growth centers in the tuberosity of the maxilla. Postnatal growth is equal to the anterior-posterior dimensions of the three molar teeth. An equal amount of growth occurs at the transverse suture of the palate. The posterior palatine arteries supply the blood necessary for this growth and the dense scar tissue resulting from multiple operations imposes an insurmountable handicap.

In cleft lip, the problem is not that of positioning of the bone but of form. The dental arches and alveolar processes are normally molded around the tongue by the action of the buccinator and lip muscles. Any break in the restraining action of these muscles permits the tongue to expand the dental segments. The chief objective of cleft lip surgery should be to establish a normal relationship between tongue and lips.

Slaughter, Wayne B., and Brodie, Allen G.: Facial Clefts and Their Surgical Management in View of Recent Research, Plast. & Reconstruct. Surg. **4**:311-317 (*April*) 1949.

The Role Of CARBOHYDRATES *In* DENTAL CARIES

LIEUTENANT (jg) GEORGE H. GREEN (DC) USNR

Review of Dental Facts

1. At 2 years of age, 50 per cent of the children examined in recent studies had one or more carious teeth.

2. By the time children reach school age, they usually have three carious teeth.

3. At the age of 16, nearly 75 per cent of them have lost one or more permanent teeth, the average youth having seven teeth carious, missing, or restored, with 14 tooth surfaces involved.

4. Less than 50 per cent of persons in the United States who are over 35 years of age have a usable number of natural teeth.

5. Approximately 40 per cent of the entire population have crooked, protruding, or malformed teeth.

6. Adult Americans need a total of 144,000,000 dental services a year to meet current emergencies, exclusive of accumulated needs; only about 40 per cent are met.

7. If there were the manpower in dentistry to accomplish the treatment of these mouths, the cost would be about 5 billion dollars, ten times as much as Americans have ever spent in a peak year on dental care.

8. It would require at least twice as many dentists as the nation now has to meet its annual dental needs.

Carbohydrate Metabolism

Definition—1. Carbohydrates are either simple sugars or substances that form simple sugars when they are hydrolyzed. 2. There are three types of carbohydrates (1) the monosaccharides, (2) the disaccharides, and (3) the polysaccharides.

Digestive Processes—Each is of more and more complex molecular structure. The digestive processes, starting with the salivary juices and ending with the ferments of the small intestines, break down the carbohydrates into less and less complex forms until they all terminate as monosaccharides and are absorbed from the intestine to become available glucose.

Functions of Carbohydrates—In the body carbohydrates have several uses: 1. The production of energy for work of the skeletal muscles and organs of the body. Approximately 65 per cent of the necessary energy is derived from oxidation of carbohydrates. 2. The production of heat. 3. The neutralization of toxins to which the body is constantly subjected. 4. An aid in the metabolism or oxidation of fats.

Adequate Carbohydrates Should be Available in the Diet—1. Excessive amounts of carbohydrates should be eliminated. 2. Dextrose can be derived from the carbohydrate content of many fruits and vegetables. 3. Fifty-eight per cent of all proteins are theoretically converted into dextrose and the glycerol fraction of fat, which ordinarily makes up 10 per cent of its weight, is converted into glucose. 4. It is entirely possible to have normal nutritional requirements in diets which are designed to limit the growth of *Lactobacillus acidophilus* and consequently the development of dental caries.

Etiology of Dental Caries

1. Dental caries is caused by dissolution of the enamel structure of the tooth.

2. It is known that (A) the organic matrix of the enamel is destroyed as a result of proteolytic digestion, and (B) the inorganic components of the enamel are destroyed by bacterial activity which causes the degradation of carbohydrates to acid.

Two Theories—1. The acidogenic theory proposes that caries result from decalcification of the enamel and dentin caused by degradation of carbohydrate to acid, followed or accompanied by proteolysis of the organic matrix.

2. According to the proteolytic theory caries result from proteolysis of the organic substance of the enamel and acid action resulting from carbohydrate degradation is a component of the process.

Acid Formation an Important Consideration—Acids are formed in the protected areas of the mouth by a series of enzymatic reactions. Many enzymes, all of which are formed in varying amounts by the acidogenic microorganisms of the mouth, and by certain co-enzymes, many of which are found in an adequate diet, are involved in the process. By means of these reactions acids are formed in *every* mouth, whether susceptible or immune to caries, if a suitable substrate is present. This substrate must be, in most instances, a fermentable sugar.

Acid Formation and Neutralization—There are three main ways in which the rate of acid formation and nuetralization may be influenced: (A) through changes in the diet, (B) changes in the tooth, (C) changes in the saliva. Many factors tend to alter each of these among which are the following: (1) the endocrine glands, (2) emotional states, and (3) heredity.

Carbohydrates in the Acidogenic Theory

1. It is obvious that the only substrates from which acids can be formed are the carbohydrates. The monosaccharides and the disaccharides are the ones most likely to be converted into various acids under the conditions found in the mouth.

2. Lactic acid formation during muscular activity is an extremely rapid process and acid formation in the oral cavity can be just as rapid if necessary enzymes and co-enzymes are present.

3. Although each pure strain organism could not alone accelerate all the reactions, a symbiotic relationship of all of them can accelerate each of the intermediate steps. Therefore it is conceivable that acids are formed rapidly following the ingestion of fermentable carbo-

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hydrates. It is claimed that reaction takes place within ten to twenty minutes after consuming such foods.

4. In addition to providing the substrate from which the acids are formed, carbohydrates are believed to provide a growth factor for the bacteria which bring about the acid production.

5. The consumption of carbohydrates must produce a systemic effect on the caries process.

6. The consumption of excessive amounts of carbohydrates causes a change in the saliva which in turn makes a more favorable medium for the growth of the acid-forming bacteria.

7. The concept that carbohydrates play an extremely important role in the acidogenic theory of dental caries is accepted by the majority of dentists.

Carbohydrates in the Proteolytic Theory

Those who believe in the proteolytic theory of dental caries contend that the organic substance is destroyed first, or at least simultaneously, with the acid decalcification. Carbohydrates are not quite as important in this concept as they are in the acidogenic theory. It is admitted, however, that the reduction of carbohydrates as a control measure in dental caries is to be desired. As in the acidogenic concept, the carbohydrates provide (1) substrate for acid formation, (2) a growth factor for the bacteria which brings about the acid production, and (3) a systemic effect on these same bacteria.

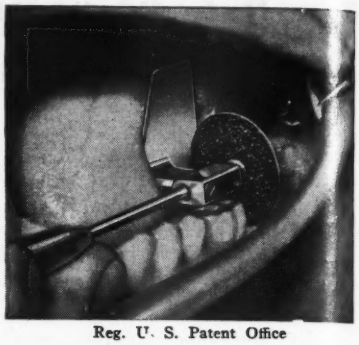
Source of Undesirable Carbohydrates

1. Of the three types of carbohydrates, the monosaccharides and the disaccharides are the most simple in structure and therefore the ones which would be expected to be the most rapid acid formers.

2. The polysaccharides, or starches, are more complex in structure and are not so readily converted into acid.

3. In cases of widespread caries

(*Continued on page* 508)



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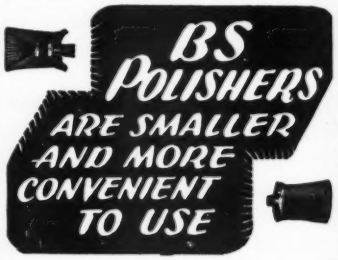

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(This quotation is taken from a recent letter)

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The above *voluntary* comment is typical of letters we receive almost every day. It typifies the manner in which *Visual Education In Dentistry* is received in countless thousands of dental offices. Its terse "wonderful opportunity to explain dentistry to the patient" is the chief reason for this series of 31 charts which is now in its tenth reprinting. And this practitioner's request for a second copy is the rule rather than the exception—one copy for use in the operatory and one copy for the reception room.

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30. The Requirements of a Correct Restoration
31. Development of the Skull

The present reprinting of *Visual Education In Dentistry* is identical with the previous edition with one exception—a new four-page two color chart entitled *THE DANGERS OF PYORRHEA AND POSSIBLE COMPLICATIONS.* It portrays possible complications in the blood stream which could stem from a pyorrhetic condition. Patients can readily assimilate this type of presentation. This is only one of the 31 charts in the complete booklet (see titles of the other 30 charts in the box on the left).

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CLINICAL AND LABORATORY SUGGESTIONS

(*See pages* 498 *and* 499)

Form to be Used by Contributors

To: Clinical and Laboratory Suggestions Editor

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708 Church Street
Evanston, Illinois

From: _____

_____

Subject: _____

Explanation of Procedure:

Sketch:

Suggestions submitted cannot be acknowledged or returned.

$10 will be paid on publication for each suggestion that is used.

(*Continued from page* 504)

treated by carbohydrate restriction, it was found necessary to reduce both sugars and starches in only 10 per cent of the cases. Restriction of sugars alone gave desirable results in 90 per cent of the cases.

Starches Converted to Sugars—1. Although ptyalin in the saliva will convert boiled starch to sugar, it usually does not remain in the mouth long enough to be hydrolyzed by ptyalin.

2. The food swallowed is thoroughly mixed with saliva and accumulates in the upper portion of the stomach. Here the ptyalin continues to act until the hydrochloric acid of the stomach has penetrated the mass and reduced its alkaline reaction to a point where the action of this enzyme is inhibited. Since this often takes considerable time, a large part of the ingested starch may be hydrolyzed by this enzyme. This action rarely takes place in the mouth.

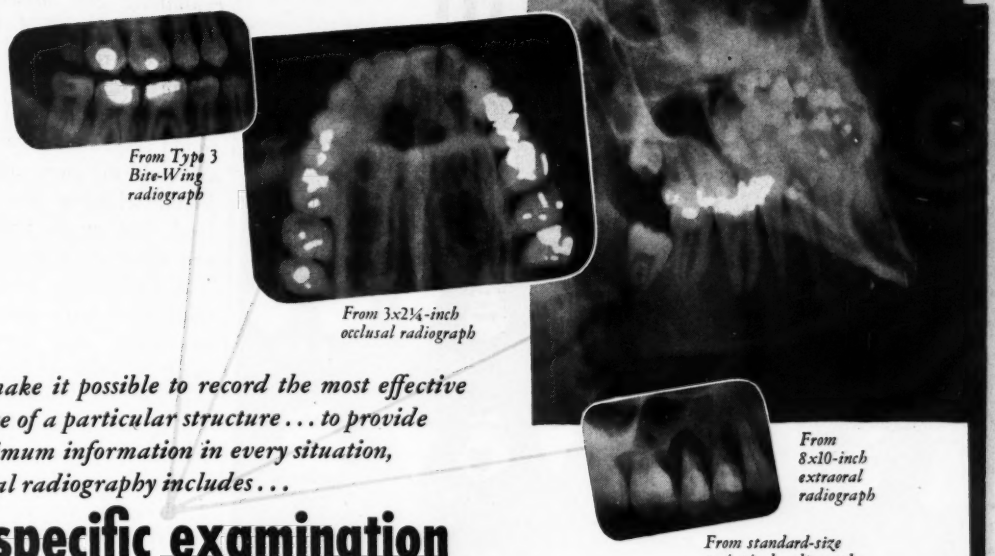
Sugars can be Rapidly Converted in the Mouth—1. It has been shown that fructose, glucose, and sucrose can cause a decrease of approximately 0.8 pH within a five-minute period. Rapid production of acid from dextrose (glucose), fructose, maltose, and sucrose has been demonstrated in the mouth.

2. Lactose produced much smaller pH changes, while cooked starch paste produced pH changes similar to maltose but more slowly when it was held in the mouth.

Results of Experiments—1. It is evident that (1) fructose and glucose are most damaging and (2) lactose is the least harmful. These sugars are not found free in nature to any extent or in high concentration.

2. In refined carbohydrates a high concentration of these sugars is found. The chief concern is not sugars found in their natural state as in fruits and vegetables, but in their refined state (jams, jellies, candies, bakery products.)

Types of Refined Carbohydrates—Some of the most widely used refined carbohydrates are bakery and confectionary products, ice cream, and soft drinks. Approximately 11



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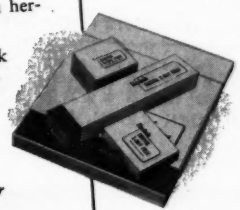

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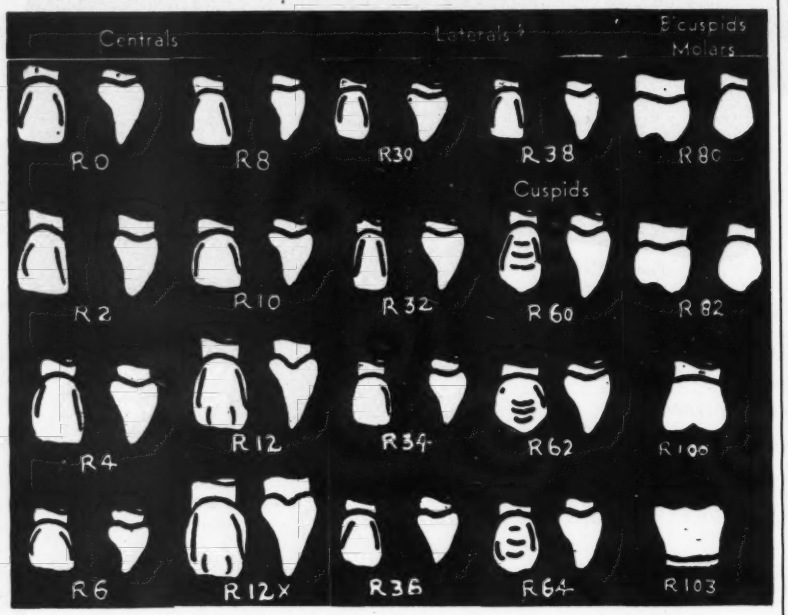

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billion bottles of soft drinks per year, *containing 500 million pounds of sugar*, are required to satisfy the public craving.

The Establishment of Habit—1. From the nutritional standpoint it would seem that sugar should be, of all foods, the most cautiously used in feeding children lest it displace the foods that supply proteins, vitamins, and mineral elements.

2. Parents are told today that infants must have glucose and highly sweetened milk formulae. In the early months and years of life a craving for sweets is established which in later life requires 140 pounds per year to satisfy.

Sugar Consumption Increasing—1. Recently reported figures from the Department of Agriculture indicate that within the next year our population will consume 8,500,000 long tons of sugar; each resident will eat annually virtually his own weight in sugar, a daily average of 28 teaspoons.

2. *Hygeia*, published by the American Medical Association, states that the maximum allowances of sugar for one day should not be more than 6 teaspoons. Some candy bars contain as much as 13 teaspoons of sugar while an average piece of iced chocolate cake or cherry pie may contain as much as 15 teaspoons of sugar.

White Flour and Refined Starches—1. Because certain important factors, such as water-soluble vitamins B and C, have been removed in the refining process, subclinical and clinical entities, such as pellagra and scurvy, have appeared.

2. The concentration of starches and sugars results in the loss of large amounts of cellulose which furnish roughage.

Methods of Caries Control

1. The adoption of a low sugar diet is one of the best and most direct methods.

2. The Michigan group found that by reducing sugar alone in the diet of some cases, and sugar and starch in others, depending on the degree of caries susceptibility, the salivary acidophilus may be reduced

to extremely low counts or zero and in some cases caries is completely arrested.

3. Many dentists are now controlling caries in children simply by withholding sugar from their diets. In some highly susceptible cases, however, this alone will not stop the disease. It is then necesary to reduce the starch intake as well.

The Relationship Between Carbohydrates and the Growth of L. Acidophilus—1. In 81.7 per cent of 1,228 cases of unchecked dental caries a reduction of the *L. acidophilus* index was obtained within a period of a few weeks by reducing the intake of refined carbohydrates and replacing the calories derived from these foods by increasing the intake of meat, eggs, vegetables, milk, and milk products.

2. It was shown that *L. acidophilus* is consistently present during caries activity and absent during caries inactivity. The reduction of a high *L. acidophilus* count was accompanied by a reduction in dental caries frequency.

Preventive Measures—1. A program of dental caries prevention based on *L. acidophilus* indexes and corrective procedures could be entirely practical and effective in private practice, institutional work, and the Public Health Service.

2. The entire procedure wherever applied need not interfere with other routine treatment because it can be accomplished within a few minutes.

3. The effectiveness of correction can be determined within a week, and the time, effort, and cost of these preventive procedures are only a fraction of those necessary for repair.

The Use of Detergent Foods—These foods, which act as cleansing agents in the mouth, actually clean the teeth more efficiently than the toothbrush. Although difficult to measure, it has been shown that the number of oral bacteria were reduced after the use of apples, paraffin, and oranges.

Prenatal and Postnatal Care—1. The importance of an adequate, well-balanced diet during the prenatal and postnatal development of the teeth cannot be overemphasized.

2. The proper care and maintenance of the deciduous teeth and orthodontic treatment for malposed teeth is valuable in preventing cavities. It has been claimed that proper care of the deciduous teeth would prevent 40 to 50 per cent of the dental ills encountered in later life.

Topical Applications—The American Dental Association recommends the topical application of sodium fluoride as a routine procedure for all children. On the average, it has been shown to reduce decay by 40 per cent.

The Gottlieb Method—It is claimed that this impregnating treatment is 90 per cent effective as compared to fluorine which is only 40 per cent effective. Two solutions are recommended, 40 per cent zinc chloride, followed by a solution of 20 per cent potassium ferrocyanide. A chemical reaction takes place which penetrates the entire length of the lamellae. This treatment has been tested and is well supported by the results.

Dibasic Ammonium Phosphate Used—The Council of Dental Therapeutics of the American Dental Association has approved for clinical trial a product containing the active ingredients, dibasic ammonium phosphate and urea.

Vitamin K—Vitamin K has been incorporated in chewing gum. Although chewing gum contains some carbohydrate, it stimulates the salivary glands, neutralizing acids that may be present. Chewing gum is also a satisfactory cleansing agent and 98 per cent of the gum on the market today contains calcium carbonate which has been found to reduce dental caries.

Prophylaxis—Routine scaling and polishing of the teeth are of positive value in preventing both dental caries and periodontal disease. In order that toothbrushing be effective the following requirements must be fulfilled:

1. The toothbrush must remove the food debris immediately after eating.

2. Toothbrushing must be done thoroughly. Casual brushing of exposed surfaces of enamel will not pre-

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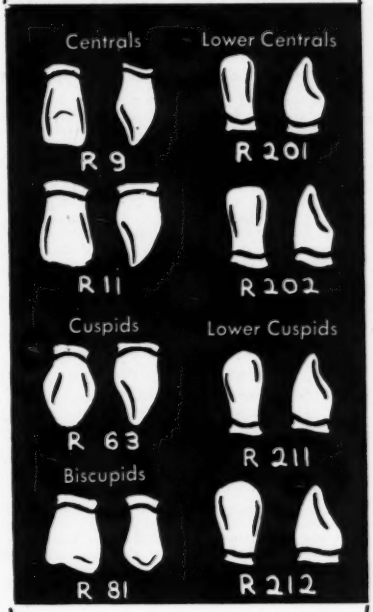

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vent or reduce interproximal or pit and fissure caries.

3. A survey reveals that the average young adult spends about sixty-seven seconds in brushing his teeth. This is not enough time to allow thorough cleansing of each interproximal surface.

Summary

1. For the control of dental caries, prevention is needed. Systems of inspection and advice are good and necessary but in themselves are futile and almost useless in stemming the tide of this national disease. No expenditure of public money for the treatment can be justified unless that treatment strikes at the cause of the trouble and gives reasonable hope that the incidence of the disease will be materially lessened.

2. Carbohydrates are a needed item of food and a lack can cause acidosis. It is also possible to eat too many carbohydrates and if carbohydrates are consumed at the expense of necessary proteins and fats, malnutrition results. The present rate of consumption, over 140 pounds of sugar per year per person, presents the dangers incident to overeating.

3. The role of carbohydrates in the production of dental caries is found to be important in both the acidogenic and proteolytic theories.

4. Dental caries activity can be reduced 70 to 90 per cent by the adoption of low sugar diets.

5. The topical application of sodium fluoride can reduce dental caries 40 per cent. (1) Proper oral hygiene, (2) the use of dibasic ammonium phosphate and urea, and (3) caries control methods should eventually check this widespread condition.

6. The use of a controlled carbohydrate diet is one of the best methods now available to prevent dental caries.

From *United States Naval Medical Bulletin* **49**:920-931 (*September-October*) 1949.

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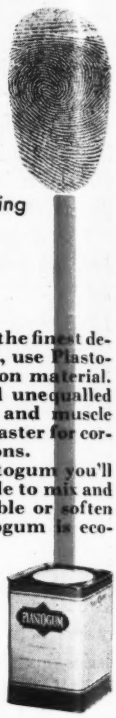

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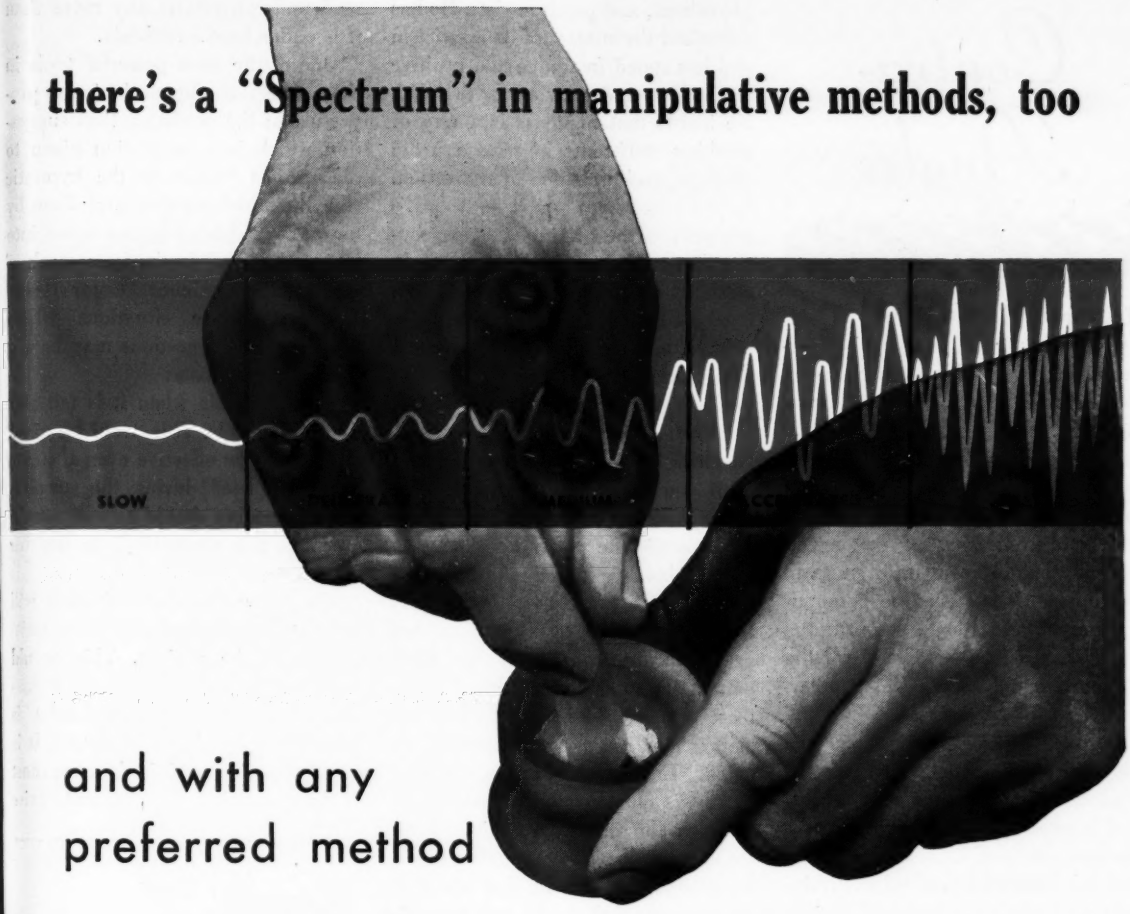

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Contra-Angles

Hypnosis Debunked

Hypnosis under the elegant title, "psychosomatic sleep" has been receiving considerable attention in the dental literature. The attempt to find a label of euphemism for hypnosis is commendable because the subject still carries lingering remnants of stagecraft and something of the occult. "Psychosomatic sleep" is not quite an appropriate label. It is too pompous and ponderous. It sounds a little too much like the "slumber chamber" that the morticians have tried to popularize.

Despite the ingrained fears and misgivings that people have toward hypnotism there is a place for the method in professional practice. When it has been removed from the stage and drawing-room as a form of entertainment and given professional dignity and a fitting name it will be more widely accepted by dentists and physicians as an *adjunct* to practice. The chemical obtundents, analgesics, anesthetics, and sedatives will not be supplanted, nor should they be. Hypnosis is a method of self-control and relaxation. The operator supplies only the words of suggestion. He is not the repository of mystic and dreadful powers. He has no gestures or incantations that will put people to sleep against their will. He has no power to inflict them with behavior contrary to their scruples and their conscience. He can throw no "spells" upon unwilling "victims."

A fine job of placing the right emphasis on hypnosis has been performed by William T. Heron, Ph. D.,[1] Professor of Psychology at the University of Minnesota. Doctor Heron has worked with groups of dentists, physicians, and psychologists. He has debunked the subject of its mysticism and has stated in simple and positive terms the true dimensions of the field. He insists that hypnosis is a way of teaching self-control, release from tensions, and a method of relaxation. In this sense hypnosis is an accurate example of the principles of psychosomatics: When a person is in body relaxed, controlled, and free from tensions his mind is correspondingly at ease, and freedom from apprehension, anxiety, fear, and insecurity means a relaxed body.

The most elemental fact in psychosomatics is: The mind rules the body, or if you prefer, the nervous system controls all the functions of the body. In hypnosis the patient is taught to control his own mind and thus his bodily reactions. The operator sets the stage by positive suggestions that are within the experience range of the patient. He tells the patient, "I can teach *you* to relax; *your* every tension is gone; *you* are completely relaxed." Even in the deepest state the patient is not unconscious, nor is he asleep in the sense of nighttime sleep. He is entirely aware of what is going on around him except that his perceptions are dulled. He acts uncritically to suggestions provided they do not offend his moral scruples. His will power is not destroyed. No damage has come to his mind, body, or soul.

At the invitation of Doctor Heron I recently attended a demonstration of the methods used in the inducting of hypnosis. The patients were made comfortable and at ease. They were allowed to ask any questions that occurred to them. They were asked to close their eyes and place their bodies in relaxation.

The suggestions that were made were within the experience range of the patients. There was no particular formalism to the technique and no incantations or mumbo jumbo.

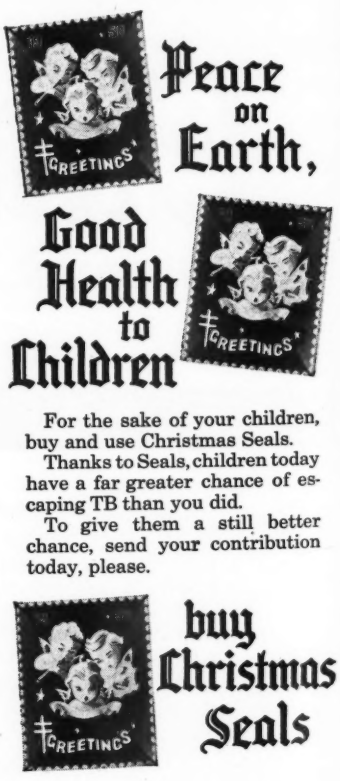
Doctor Heron easily induced analgesia in the hand of the subjects and in the jaw. The area of analgesia in the jaw was tested by one of the dentists present and he affirmed that the area was completely free from pain sensation when touched with a sharp explorer. Pressure sense is not obliterated under hypnosis any more than it is under local anesthesia.

One of the most powerful tools in the hands of the hypnotist is the proper use of the posthypnotism suggestion which is a suggestion given to the subject "while in the hypnotic state but which is to be carried out by the patient after emerging again into his usual state." In the framework of the dental experience Doctor Heron described twelve situations where posthypnotic suggestions may be put to work by dentists:

(1) Analgesia when it is felt that this is desirable. This could be given and should be effective even if novocaine was used during the surgery. This suggestion should have a terminous, e.g., this analgesia is to last for 24 hours.

(2) Suggestion that a denture will feel comfortable and give great satisfaction to the patient. This would seem not to violate any ethical considerations provided the dentist is skilled in the fitting of dentures. It is assumed that if such is the case most of the complaints from patients arise

[1]Heron, William T.: Clinical Applications of Suggestions and Hypnosis, Springfield, Illinois, Charles C Thomas, Publisher, 1950, pp. 78-80.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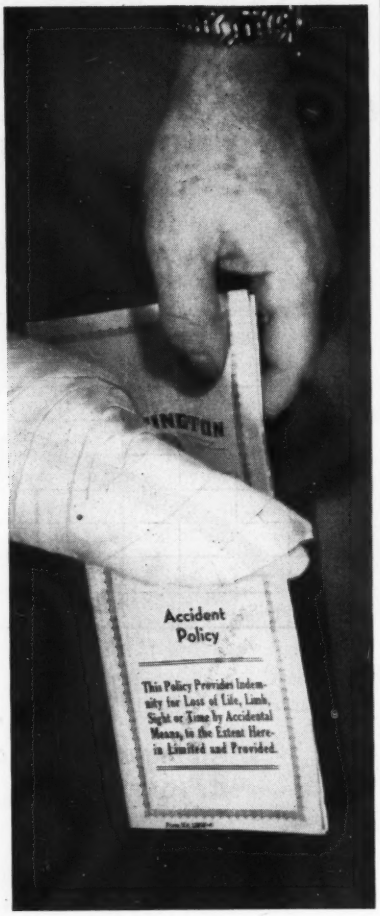
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Yes, you may think you are insured . . . and still find that none of your several policies gives adequate coverage in case of permanent injury to one of your hands! The loss of a thumb, for instance, would end a dentist's career, yet the usual policy pays only $5,000 for loss of thumb *and* forefinger. It is wise to read your policies carefully. W. Clifford Klenk's article tells you what to look for.

★ ★ ★

"Dentistry on Time"—Gordon Duncan explains in detail a dental credit plan which has been tested in Detroit for the past nine years. It has proved to be the solution of the dental financing problem for low and middle income groups of patients. If your community has no such plan at present, this method of budget payment is well worth investigating.

★ ★ ★

"Railroading Dentist"—Doctor G. L. Hooper of North Carolina has an almost perfect hobby—model trains. Whether you are a fellow enthusiast or not, you will find the description of his ingenious devices interesting.

★ ★ ★

"Treating the Alcoholic Dental Patient"—Doctor Joseph Murray believes that it saves a lot of time and trouble if a dentist understands the symptoms of chronic alcoholism and knows the correct treatment of the dental patient who exhibits these symptoms.

★ ★ ★

Interesting, indeed, is the map showing the location of the 219 dental societies enrolled in the Long-distance Telephone Course offered by the University of Illinois College of Dentistry. An added feature of the course, this year, will be short talks on emergency first-aid treatment.

★ ★ ★

"Telephone Tips for the Dental Office"—Robert F. Welch presents a check-list of questions which will help you and your staff determine whether you are getting maximum benefit from your telephone contacts with your patients.

★ ★ ★

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from the fact that they are unaccustomed to the denture and all that is necessary is for them to wear it for a while to get used to it. Complaints of this nature should be largely eliminated by the proper posthypnotic suggestion.

(3) Suggestion that hereafter the patient will not allow himself to be put into the hypnotic state except for medical or dental treatment and only by a person qualified to give such treatment or under the direction of such a person.

Probably few patients would be tempted to allow themselves to be put into a hypnotic state for entertainment or other undesirable reasons but it is just as well to give the instruction indicated above.

(4) If it is known that the patient must return for another appointment and if the date can be agreed upon beforehand, it would be possible to give a posthypnotic suggestion to the effect that the patient will be sure to keep this appointment. In this way, broken appointments could be reduced in number. No doubt there are certain patients more prone to break appointments than others. The dentist might confine suggestions of this kind to that type of patient.

(5) Suggestions designed to relieve the apprehension and anxiety of the patient in regard to dental treatment, e.g., that dental treatment can be quite without discomfort if done correctly: "You will look forward to your next dental appointment with pleasure now that you know how comfortable you can be in the dental chair."

(6) Suggestions designed to foster correct care of the teeth, e.g., frequent check-ups in order to catch trouble at an early stage, proper brushing of teeth, etc. Suggestions of this sort are constantly given by dentists and they will be more effective if given during the hypnotic state as well as in the waking state.

(7) Suggestion that after this the patient will go into the relaxed hypnotic state very quickly in the dental chair. The dentist may specify that he will give the patient a signal or he may go quickly through the same procedure.

(8) Suggestions that when the patient awakens he will feel rested and refreshed, fully awake, cheerful and happy, that a session in the dental chair is, under these conditions, restful and relaxing; that this state of relaxation called hypnosis is a very pleasant state to be in.

(9) Suggestions limiting the use of sweets, especially between meals, if it appears that the patient has undue caries because of eating candy, drinking soft drinks.

(10) Suggestions to counter the exploration of a new filling by the tongue in cases where it is felt that the patient might irritate the tongue by this activity.

(11) If the dentist is using a card recall system, a posthypnotic suggestion as follows could be given: "When you receive my card—months from now you will recall the comfortable experience you have just had and desire another appointment for an inspection of your teeth."

(12) As a routine procedure give a posthypnotic suggestion about nighttime sleep: "Tonight when you go to bed you will have the best sleep of your life. In the morning you will awaken feeling wonderful because you had such a good sleep."

After seeing Doctor Heron's demonstration I was anxious to see if I could put someone into the hypnotic state. Fortunately, I had four audacious volunteers in the persons of two of my daughters, a son-in-law, and a skeptical friend. Without exception the four entered the hypnotic state without resistance or effort and they all developed analgesia in their hands and face upon suggestion. The inductions were performed in the home surroundings which may be different from the atmosphere in the dental office. I consider my limited experience as a test pattern. I have no intention of using hypnosis as a parlor trick.

How far may we expect hypnosis to be accepted in dental practice? First, there are prejudices to overcome. The public is skeptical of the procedure and may identify it with quackery or entertainment. It may be a little strain to a dentist's reputation in the community to be identified as a hypnotist. Among many persons there is still fear of the evil eye and the occult. The wise dentist will go very slowly, and will at first try the procedure on intelligent, cooperative, and friendly patients. *And he should never use the word hypnosis.* "A method of self-relaxation" is a better expression. Second, the method can never be used routinely or universally because some people are resistant. Patient cooperation and willingness are fundamental to success. Third, often too much time is required in induction to make the method practical in the busy dental office.

As a final word of caution: Dentists should be neither scoffers nor fanatical advocates of hypnosis. It is a valid psychologic phenomenon that should be confined to professional practice. To make it a subject of entertainment may bring the method and the hypnotist into public disfavor.

—E. J. R.

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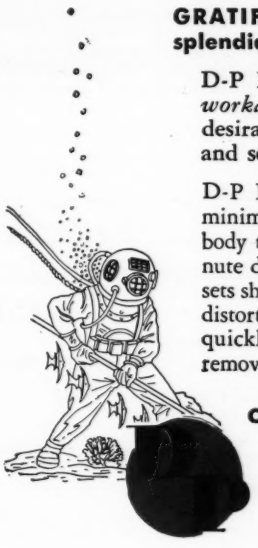

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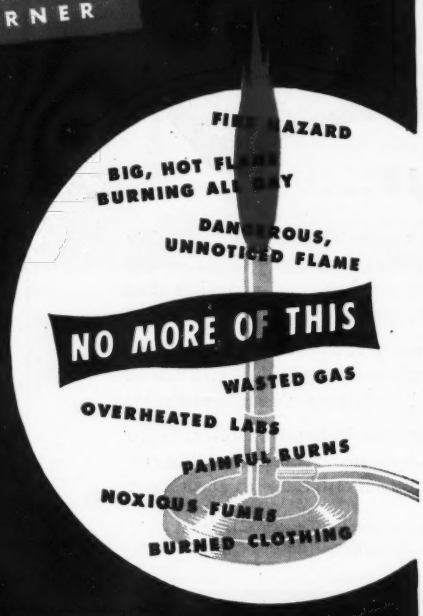

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Of Dental Digest, published monthly at Pittsburgh, Pa., for October 1, 1950.
State of Pennsylvania,
County of Allegheny,
ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared M. B. Massol, who, having been duly sworn according to law, deposes and says that he is the Publisher of the Dental Digest, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

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